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Keywords
fiscal policy, labor market, narrative approach, panel data, hysteresis
JEL Codes
C23, E24, E62

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Andrea Tafuro[1]

12/16/2014

Abstract

This study investigates whether fiscal policy is able to affect the trend of employment rate, triggering hysteresis independently from GDP behavior. I attempt to shed a light on this issue analyzing a Panel of 17 OECD countries, covering the period 1980-2009 with annual data. The effects of fiscal policy are estimated with a SVAR, where the exogenous fiscal shock is identified employing a recent dataset provided by the IMF, containing predetermined fiscal policy changes due to fiscal consolidation issues. My results suggest that a fiscal shock can modify the employment equilibrium level even without influencing potential output. The fiscal multiplier for the employment rate trend after two years is -0.55 and accounts for almost half of the multiplier for overall employment rate (which is -1.10), while is -0.11 – and not significant – for the potential output. The multiplier for the real per capita GDP is -1.04, which sharply contrasts with the "expansionary austerity" hypothesis. Various extensions are presented, considering the role of composition, monetary policy, and state-dependency. Spending cuts affect employment more than tax increases, while tax effects are larger on real per capita GDP. Such a result may be explained by different reactions of monetary policy. The evidence advocates that the multiplier is state-dependent, i.e. larger during recessions, and such effect is stronger on employment trend.

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1. INTRODUCTION

Today, an increasing amount of research focuses on the conditions making fiscal policy more effective, thereby busting the economy recovery. This study tries to answer a slightly different question, that is whether fiscal policy can modify the economy equilibrium. To this end, it presents new empirical evidence on how fiscal policy affects the labor market in the long-term. Therefore, the study extends the literature on hysteresis followed from Blanchard and Summers (1986) seminal paper, where hysteresis is generate by supply side mechanism or frictions in the labor market (De Jong and Summers 2012), investigating whether also a demand shock – as a change in fiscal policy – is able to affect the employment equilibrium level.

The analysis of labor market response to fiscal shocks is attractive for both theoretical and empirical reasons. On the theoretical side, two branches of research are expanding: on one hand, a number of models (Campolmi, Faia and Winkler 2011; Cantore, Levine, and Melina 2013; Faia, Lechthaler and Merkl 2013; Gnocchi, Hauser and Pappa 2012; Michaillat 2014) are now trying to explain the role of labor market in the transmission mechanism of fiscal policy. On the other hand, scholars are still looking for an explanation of the jobless recovery puzzle (Galì, Smets and Wouters 2012; Gordon 2010; Riggi 2010; Shimer 2010).

From an empirical point of view, since many fiscal packages are intended to positively affect the employment rate, policy makers need a better framework to evaluate the effects of fiscal policy on the job creation process. However, the largest part of the recent literature has focused on the fiscal multiplier estimation for GDP (Auerbach Gorodnichenko 2011, Corsetti, Meier and Muller 2012, Michaillat 2012a/b). Furthermore, the few works that estimates the fiscal policy effects on labor market focuses only on the cyclical component of unemployment (Monacelli et al. 2010; Bruckner and Pappa 2012; and Turrini 2013), in spite of the importance of hysteresis to evaluate correctly the effect of a demand shock.

The literature have broadly discussed two different channels through which fiscal shock influences job creation. The first is the well-known Okun's law, which predicts a strong and negative relation between the business cycle and the cyclical component of unemployment rate (Okun, 1962). Scholars have estimated this relation: Mankiw (2012) found that a one percent deviation of output from its potential causes an opposite change of half a percentage point in unemployment. Ball, Leigh and Loungani (2013) checked the validity of the Okun's law on a panel of several countries, pointing out that the value of the estimated coefficients strongly depends on the idiosyncratic component of labor market.

The second relation follows from Blanchard and Summers (1986)'s seminal paper and successive extensions (1987a, 1987b), which argued that changes in unemployment equilibrium levels are due to a wage bargaining process with insiders and outsiders, which entails hysteresis in unemployment behavior. The presence hysteresis implies that movements in the cyclical component of unemployment – which are linked to the GDP behavior through the Okun's law – can affect the unemployment trend, changing nature of unemployment from frictional to structural. In other words, a part of the actual variation of unemployment becomes persistent, leading to a change in the equilibrium level of employment (Delong and Summers, 2012)[2].

The presence of hysteresis has remarkable consequences on the economy behavior, for instance amplifying and prolonging the effects of recessions. Bagaria, Holland and Van Reenen (2012) shows that hysteresis can keep the productive capacity of the economy persistently low. Consequently, the economy may converge to the steady state levels of output and employment in the very long-run, while in the medium term, those levels are substantially lower than without hysteresis. As a result, crises effects are larger and longer in presence of hysteresis, in agreement with Phelps (1972), who argued that there are reasons to believe that the crises impose costs even after they end. In addition, when the fiscal shock affects the equilibrium level of unemployment, the analyses on unemployment cyclical component suffer of estimation concerns, determining unreliable results. First, if a fraction of the cyclical unemployment

[2] For a review of the mechanism which can lead to the hysteresis, see Delong and Summers (2012)

becomes structural, the impact of fiscal shocks on labor market is underestimated considering only the unemployment cyclical component. Second, taking into account the equilibrium level of unemployment, researchers can better evaluate the persistency of the fiscal policy effects.

Following Guajardo, Leigh, and Pescatori (2014), this study uses a SVAR to estimate the relation between fiscal policy and employment trend. In the presented model, the possible information shortage to identify a true unexpected fiscal shock (Lütkepohl 2012) is overcame employing information from a recent dataset of exogenous fiscal shock from the IMF (Devries et al. 2011). The dataset, following Romer and Romer (2010)'s narrative approach, retains the changes in tax level and public expenditure from fiscal consolidation, which are independent to current economic development (i.e. predetermined, see Guajardo, Leigh, and Pescatori 2014). An additional strength of the study is that, relying on Panel data, it does not suffer of the drawbacks due to the time series length. The role of business cycle is evaluated with dynamic Panel regressions, in which the specifications are enriched with the NBER-based dummy from the FRED database, which takes value equal 1 when a crisis occurs.

The empirical evidence presented not only confirms the presence of hysteresis in the employment rate, but also suggests that a fiscal shock is able to change the employment equilibrium level even without influencing potential output – confirming the presence of a true hysteresis process assumed by Blanchard and Summers (1986) and Delong and Summers (2012). As a consequence, the statistical inference based on the cyclical component of unemployment would lead to an incorrect interpretation of the relation between labor market and fiscal policy. The estimated fiscal multiplier of a negative fiscal shock – i.e. a reduction in public expenditure or an increase in taxation level – for the employment rate trend is -0.55 after two years and accounts for almost half of the multiplier for overall employment rate, which is 1.10, while is -0.11 – and not significant – for the potential output. The multiplier for the real per capita GDP is -1.04, which sharply contrasts with the "expansionary austerity" hypothesis (Giavazzi and Pagano 1990 & 1996; Alesina and Ardagna 2010).

Various extensions are offered. First, I consider the effects of composition, distinguishing between the effects of a spending cut from the effects of a raise in tax level. In agreement with recent evidence in other studies (Barro and Redlick 2011; Bermperoglou, Pappa, and Vella 2013; Forni, Monteforte, and Sessa 2009), the evidence supports that spending cuts affect employment more than tax increases, while changes in tax levels are more effective on real per capita GDP. Second, I analyze the role of monetary policy, which has a different reaction between the fiscal policy tools. Monetary policy seems to be more expansionary after a spending cut, implying that central bankers interpret this policy as more credible. Consequently, an expansionary monetary policy may offset the effects of spending cuts on GDP, explaining the low GDP response to a reduction of public expenditure. Finally, I explored if multipliers are state-dependent, i.e. larger during recessions: the evidence suggest that in general this is true, confirming the findings in the related literature (Auerbach Gorodnichenko 2011, Corsetti, Meier and Muller 2012, Michaillat 2012a/b). Such effect seem to be stronger for employment trend.

The article is organized as follows. Next section sum-up the transmission channels of fiscal policy on output and employment. Section 3 explains the empirical strategy, while section 4 describes the dataset and the methodology. Section 5 discusses the main results. In section 6, conclusions are provided. Some robustness checks and a deeper analysis of the dataset is reported in the Appendix.

2. LABOR MAKET AND FISCAL POLICY

The study focus on whether a fiscal shock can modify the equilibrium level of employment, testing for the presence of a hysteresis process in the employment behavior. To this aim, my study presents a measure of employment equilibrium level and estimates the effects of fiscal shocks on both the equilibrium and cyclical components of the employment rate. This empirical framework should allow me to make important considerations on the presence of hysteresis and on its nature and consequences for the fiscal policy choice. The final end is to understand if the temporary reduction in employment level produced by fiscal consolidation is likely to become structural, i.e. if a negative fiscal shock can trigger the so-called hysteresis process (Blanchard and Summers 1986).

Fiscal consolidation have at least two effects on the economy. The first is the classical Keynesian effect: a contractionary fiscal policy – a cut of public expenditure or an increase of the tax rates – reduces the aggregate demand, lowering investment, consumption, and employment. If the agents interpret the fiscal shock as temporary, the economy will return to pre-shock level of employment and production once that fiscal policy ends. If the shock is permanent, a fiscal contraction may affect the equilibrium of the economy depending on whether the private sector is able to fill the room left by the reduction of the public sector boundaries. However, since a fiscal consolidation reduces the public debt, under the assumptions of rationality and complete information the agents increase both actual consumption and investment, anticipating the cut of tax in the future – this is the Ricardian equivalence –. This mechanism is the root of the so-called "expansionary austerity" (Giavazzi and Pagano 1990 & 1996, Alesina and Ardagna 2010).

However, other essential aspects have to be taken into account. First, the effectiveness of fiscal policy depends also on how the monetary authority behaves, i.e. if it "accommodates", or "sterilizes", fiscal policy. A fiscal shock may affect the nominal interest rate: a cut in the government deficit, reducing aggregate demand – or lowering the sovereign risk –, pushes downward the nominal interest rate. If the monetary policy is accommodative, it will push interest rates even lower, stimulating aggregate demand and reducing the depressive effects of fiscal consolidation. Second, the strength of a fiscal shock may vary along the business cycle. As a number of studies have underlined (Auerbach Gorodnichenko 2011; Baum, Popolaski-Ribeiro, and Weber 2012; Corsetti, Meier and Muller 2012; Michaillat 2012a/b) a fiscal shock has larger effects on output during downturn, implying a larger multiplier also for employment during recessions. Indeed, when the output is below its potential, there is room to raise the endowment of factors without increasing wage levels or capital remuneration, which would increase inflation, dampening the growth. Third, in agreement with Barro and Redlick (2011), Bermperoglou, Pappa and Vella (2013), and Forni, Monteforte, and Sessa (2009), I expect that the effectiveness of a fiscal policy depends on the type of policy.

The presence of different links between labor market and fiscal policy raises a number of methodological concerns. Primarily, unemployment rate is not the ideal variable to use in studies that wish to isolate the effect of fiscal shocks on job creation. The fact that the unemployment rate is the share of the difference between labor force and employment on the labor force raises both theoretical and empirical issues: on the theoretical side, labor force can be considered as a proxy of labor supply (labor supply is equal to the number of persons who are looking for a job). On the empirical side, GDP affects the level of labor force since unemployed people become discouraged and exit from the labor force during recessionary period (Barnichon and Figura 2010, Bruckner and Pappa 2012, Delong and Summers 2012). This responsiveness of labor force to the business cycle may bias the estimation of the effects of the fiscal shock: on one hand, the presence in the unemployment rate of a pure labor supply component leads to unclear results respect to the ability of fiscal policy to create new jobs. On the other hand, labor force movements in the medium-run are likely to offset hysteresis. In order to address these issues, I adopted the employment rate as dependent variable, since it has population as denominator – which is independent from the business cycle, at least in the considered period –, avoiding any bias due to the presence of a labor supply proxy.

This study proposes a comparative analysis of fiscal policy effects on employment and output, which is a crucial exercise to determine whether a fiscal policy is able to trigger the hysteresis process. Indeed, fiscal policy effects on employment trend may be due to a modification of the potential output. In this case, it is the shift in potential output that entails the change in employment trend: this type of relation can be confused with the hysteresis process, but it is not. The hysteresis process *à la* Blanchard and Summers (1986) is present only when fiscal shocks impact the employment trend without modifying the potential output level. In this case, the employment rate may be sluggish even if the economy starts the recovery after the negative demand shock.

The presence of hysteresis would have a number on implication on both theoretical and applied analysis. For instance, this transmission mechanism would be an important explanation to the "jobless recovery" of the 90s (Galì, Smets and Wouters 2012; Gordon 2010; Riggi 2010; Shimer 2010). If a demand shock has an impact on the employment equilibrium level (hysteresis), even after the complete output

recovery the employment will not restore to the pre-shock level. In addition, if the results are coherent with the "hysteresis hypothesis", the empirical studies on the cyclical component of employment/unemployment are not reliable. Indeed, if an empirical investigation does not consider that fiscal shocks modify also the trend component, focusing only in the cyclical component it will underestimate the overall effects of the shock on jobs creation.

3. EMPIRICAL STRATEGY

Table 1 reports the list of variable and parameters used in this section. The study estimates three types of relations between fiscal policy and employment. The first expresses the effect of fiscal policy on employment rate growth. It follows from the impact of fiscal policy on output growth, the so-called "fiscal multiplier" (see Spilimbergo, Symansky and Schindler 2009 for a review).

Table 1

List of variables and parameters

G_t	Change in primary balance	γ	elasticity of real GDP to capital – assumed between 0 and 1 –
Y_t	real GDP per capita	1-γ	elasticity of real GDP to labor – assumed between 0 and 1 –
E_t	employment	ϑ	fiscal multiplier of real GDP
K_t	capital	β	effect of a variation of cyclical unemployment on output
A_t	technology	β_e	effect of a variation of cyclical employment on output $\beta_e = \beta\frac{P}{L}$
L_t	labor force	φ	effect of fiscal policy on the output gap
P_t	population	δ	weight of past cyclical employment on current employment – hysteresis coefficient –
u_t	unemployment rate computed as $\frac{L_t - E_t}{L_t}$	x^*	indicates the equilibrium (or potential) level of the x variable

Notes. All the variables are expressed in absolute values and at time *t*. In the text, the lowercase indicates natural logarithm, the stars the natural - or potential – levels, and the hats the growth rates.

The effect of a fiscal shock on output growth can be written as:

$$\hat{y}_t = \vartheta \hat{g}_t \quad (1)$$

Where $\hat{y}_t$ is the real per capita output growth and $\hat{g}_t$ is the fiscal shock, i.e. the variation of the primary balance – or, if considered *per se*, the change in public expenditure or taxation – as a percentage of GDP. Converting the GDP and the fiscal policy in the same unit before the estimation I avoid an important bias of the SVAR methodology in recovering the multiplier (Hall 2009; Barro and Redlick 2011; Ramey and Zubairy 2014). Indeed:

$$\hat{g}_t = \frac{G_{t+1} - G_t}{Y_t} \approx (\ln G_{t+1} - \ln G_t)\frac{G_t}{Y_t} \quad (2)$$

The quantity in (2) has the remarkable advantage to convert the percentage change to dollar change using the value G/Y at each point in time. Consequently, the coefficients from the Y equations are in the same unit as those from the G equation (notably, all fiscal policy variables are in terms of GDP in this research). As Ramey and Zubairy (forthcoming) pointed out, this measure would potentially suffer for some econometric drawbacks. Indeed, the measurement error in Y_t induces biases since it appears as denominator in both the fiscal shock and GDP growth rates, in particular if one is interested to recover the state-dependent multiplier. This suggest checking the robustness of the estimation using a different denominator as potential output (this exercise is reported in the Appendix and my results seem to be robust to this change in the denominator).

Assuming that the aggregate production function is a Cobb-Douglas, that is:

$$Y_t = A_t K_t^{\gamma} E_t^{1-\gamma} \quad (3)$$

Taking logs and assuming no technological shock between time $t-1$ and time t, (i.e. $A_{t-1} = A_t$), I obtain that:

$$\hat{y}_t = \gamma \hat{k}_t + (1-\gamma)\hat{e}_t \quad (4)$$

Hence, rearranging terms and recalling that for small distance the logarithmic difference is equal to the percentage growth, I obtain that:

$$\hat{e}_t = \frac{1}{1-\gamma}\hat{y}_t \quad (5)$$

Which, using (1) becomes:

$$\hat{e}_t = \frac{\vartheta}{1-\gamma}\hat{g}_t \quad (6)$$

Where $\vartheta/1-\gamma$ is the effect of a fiscal shock on the employment rate growth. Notably, since $1-\gamma$ is less than one, the multiplier of the employment rate is expected to be greater than the one for the output growth and to depend on the business cycle. Therefore, during downturns, I rely on larger effects of shocks on output and even larger effects on employment rate.

The second type of relation between labor and fiscal shock is the one described using the Okun's law, recently estimated by Ball, Leigh, and Loungani (2013) and Turrini (2013), i.e.:

$$y_t^c = -\beta(u_t - u_t^*) \quad (7)$$

Where $\hat{y}_t^c$ is the output gap[3] and u^* is the Non Accelerating Inflation Rate of Unemployment (NAIRU)[4], obtained by using the Kalman filter on the relative Phillips Curve. Therefore, the NAIRU can be interpreted as a measure of both long-term and equilibrium level of unemployment[5].

I can rewrite this relation using the employment rate, obtaining:

$$y_t^c = \beta_e(e_t - e_t^*) \quad (8)$$

e_t^* is the "NAIRE" (Non Accelerating Inflation Employment Rate). The NAIRE[6] is my measure of the equilibrium level of employment rate, and it is obtained using the formula:

$$e_t^* = \frac{L_t - u_t^* L_t}{P_t} \quad (9)$$

By using (9) it is possible that a fraction of labor force volatility is transferred to my measure of employment equilibrium. Therefore, future researches should refine this measure of employment equilibrium level, applying a filter directly on employment rate.

Using equation (9) and defining the interaction between fiscal policy and the output gap as:

[3] Computed as $(GDP - Potential\ GDP)/Potential\ GDP$

[4] The NAIRU can be defined as the level of unemployment to which the economy tends to adjust after a supply shock or a policy intervention (Turner, Boone, Giorno, Meacci, Rae, and Richardson 2001; Guichard and Rusticelli 2011) along a given Phillips curve. The combined action of structural breaks and expectations contained in the Phillips curve equation can change the value of the NAIRU, so the estimation technique allows for time-varying levels of it. The largest part of the studies to retrieve a time-varying measure of the NAIRU apply a Kalman filter to a Phillips curve model (Guichard and Rusticelli 2011). However, as Dickens (2009) highlights, the complicated relations among inflation, its own lags, supply shocks, unemployment and its lagged values lead to a lack of robust results and to large confidence intervals around the NAIRU.

[5] This is why, from now on, the terms "equilibrium" and "long-term" will be used as synonyms.

[6] A measure of potential employment is contained in the OECD Economic Outlook Database. However, the starting year is 1985 (or later for some countries like Germany and Ireland), so that a large number of observations would be lost by using such a measure.

$$y_t^c = \varphi \hat{g}_t \tag{10}$$

We obtain:

$$e_t - e_t^* = \frac{\varphi}{\beta_e} \hat{g}_t \tag{11}$$

Where the stars indicate the potential (or natural) values of the variables, φ is the effect of fiscal policy on the output gap – which should be sizable different from ϑ –, and φ/β_e represents the fiscal multiplier of cyclical employment rate. Recent studies estimated a similar coefficient for the cyclical component of the unemployment (Ball, Leigh, and Loungani 2013, Turrini 2013).

In absence of hysteresis, the fiscal shock would affect only the cyclical component of employment. However, we must also consider that fiscal shocks may influence the trend component of employment through hysteresis and output trend shifts, i.e. e_t^* depends on time and cycles, as the subscript t indicates. This implies that the inference based on the estimation of φ/β_e would be unreliable because both the impact of a fiscal shock on the cyclical employment and the persistency of the shock effects would be underestimated – or overestimated –.

The size of this distortion, and the persistency of the shock, is retrieved estimating the relation between fiscal policy and employment trend. Following Blanchard and Summers (1986, 1987ab), the hysteresis relation may be described adopting a simple aggregate equation for the long-run employment:

$$e_t^* = (1 - \delta) e_{t-1}^* + \delta e_{t-1} \tag{12}$$

In equation (12), the NAIRE component of employment rate depends on its past value for a fraction $(1 - \delta)$ and on the past values of the cyclical component for a fraction δ. Rearranging the terms and using (11), I obtain equation (13) for the effects of fiscal policy on employment trend:

$$e_t^* - e_{t-1}^* = \delta \frac{\varphi}{\beta_e} \hat{g}_{t-1} \tag{13}$$

Where $(\delta * \varphi)/\beta_e$ represents the effects of the fiscal shock on the difference between the equilibrium level of employment rate at time t and at time $t - 1$. Given that it is hard to interpret such a parameter, it is more convenient to obtain an elasticity measure by computing the effect of a fiscal shock on the growth of the NAIRE. Hence:

$$\hat{e}_t^* = \theta \hat{g}_{t-1} \tag{14}$$

Where

$$\theta = \frac{\delta}{e_{t-1}^*} \frac{\varphi}{\beta_e} \tag{15}$$

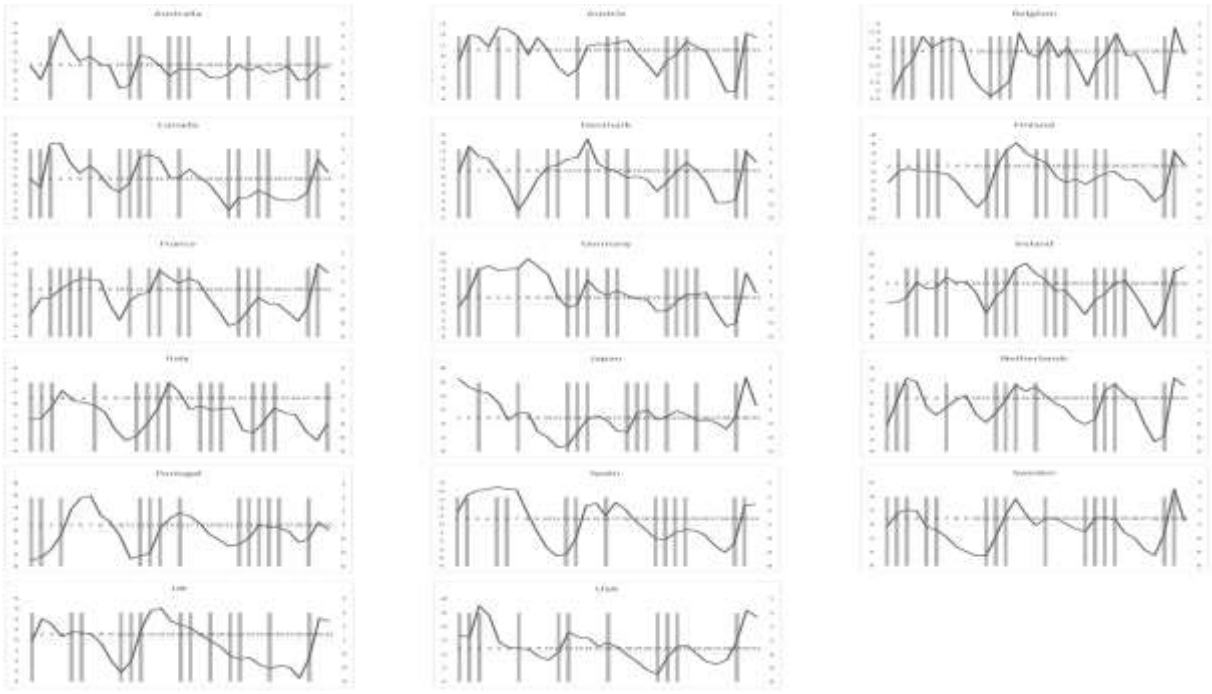
θ may be interpreted as the elasticity of employment trend to a fiscal policy change. The effect of a fiscal shock on NAIRE is equal to the effect on the cyclical component φ/β_e multiplied for a coefficient δ, where $0 < \delta < 1$. $(\delta * \varphi)/\beta_e$ is not expected to be significant for a large number of periods, since its value decreases exponentially[7]. This means that once shocked the NAIRE moves toward a new equilibrium. In addition, fiscal shock affects structural employment only after one period. However, the analysis would not retrieve the presence of this lag given both the nature of the data, which are annual, and the presence of rational agents.

[7] for at time $t - s$ lag of the fiscal shock will be $\delta^s \frac{\varphi}{\beta_e}$

4. DATASET AND IDENTIFICATION

The analysis is conducted on a Panel of 17 OECD countries (Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, The Netherlands, Portugal, Spain, Sweden, UK, US), using annual data from 1980 to 2010. The data are collected using different sources: a dataset provided by the IMF (Devries, Guajardo, Leigh, and Pescatori 2011, which is extensively analyzed in Appendix) provides information on consolidation fiscal policies[8]. The employment rate and the variables for the estimation of its natural level are from the OECD database, excluding Germany and Ireland for which a sufficiently long time series was unavailable. For these two countries, I exploited the data from the AMECO dataset, then: first, I used the NAWRU instead of the NAIRU as measure of unemployment equilibrium[9]. Second, for Germany the observations for employment and labor force until 1990 were retrieved from the data on West Germany. Third, for Ireland, the employment rate until 1995 was estimated using data on unemployment rate, labor force, and population.

Figure 1 Output Gap (solid line, right scale) and NBER based recession indicator (grey areas, left scale)



Notes. The figure reports the output gap with solid lines, and with a grey bar the years in which the NBER indicator assumes value equal one (i.e. a crisis is occurring). Data are from NBER (NBER indicator) and IMF World Economic Outlook database (output gap). As time indicator, the figures report from 1=1980 to 31=2010.

In order to measure the business cycle I opted for the business cycle indicator from the FRED dataset, which considers the behavior of several variables to compute a recession dummy. Therefore, this should signal in a more complete and precise fashion the business cycle phases than other indicators as the output gap. The dummy is reported in Figure 1, where grey areas are crises periods as detected by NBER method, compared with the output gap behavior (reported in inverse scale). As it is possible to see, the two variables do not always coincide. The multidimensional nature of the links between fiscal shocks and

[8] Since the construction of this variable follows the narrative approach from Romer and Romer 2010, I will refer to it also as "narrative fiscal variable"

[9] The NAWRU is computed by the EU Commission while the NAIRU is computed by OECD and IMF. The main differences is that the former estimates the level of unemployment that does not accelerate the change in wages level, while the latter calculates the level of unemployment which does not accelerate inflation.

business cycle is taken into account through an interaction variable between the shocks and the business cycle.[10]

Following Guajardo, Leigh, and Pescatori (2013), the equation to estimate the unrestricted VAR is:

$$\boldsymbol{y}_{it} = \boldsymbol{f}_i + \boldsymbol{\delta}_t + \sum_{s=1}^{T} \boldsymbol{y}_{it-s}\boldsymbol{\Phi}_{t-s} + \boldsymbol{u}_{it} \quad (16)$$

In (16) subscripts i indexes country and t indexes years. $\boldsymbol{y}_{it}$ is the vector of dependent variables (fiscal policy, real GDP per capita, and employment rate), $\boldsymbol{y}_{it-s}$ is the matrix containing all the variable lagged for s periods, $\boldsymbol{\Phi}_{t-s}$ is the matrix of coefficients for the correspondent lagged vector of regressors, $\boldsymbol{f}_i$ is the vector of fixed effect for country i and $\boldsymbol{\delta}_t$ is the vector of time dummies. $\boldsymbol{u}_{it}$ is the vector of error terms. The number of lags is chosen using the AIC. The VAR estimation is repeated for all the three dependent variables (growth rates, deviation from the equilibrium rate, trend growth rates).

By and large, my methodology consists in demeaning each cross-sectional unit: doing that, I can treat my panel VAR as a stacked time series. Roughly speaking, I deal with my panel as it is a unique time-series of 527 observations from a single country. This procedure has two noteworthy shortcomings: first, since I transformed the data as if they come from one country, I lose all the cross-sectional information. Therefore, I cannot enrich the analysis modeling the cross-countries relations. Second, using fixed effect I impose that the underlining structure of the economies is the same. This would bias the results on the shock persistency, in particular when the time-series dimension is small. The use of a GMM or IV estimation would be a good approach to overcome such limit (Assenmacher-Welshe and Gerlach 2008), and this is exactly what is done in this paper, identifying the structural shock in the SVAR analysis via the dataset of predetermined fiscal policy.

The identification of the structural shocks is the central issue in the SVAR methodology. Indeed, as a huge literature pointed out, the covariance between the residuals in (16) is non-null, i.e. the variance-covariance matrix is not diagonal. Instead, it is desirable that a shock affecting the economy is not correlated with the other shocks. This type of shocks is also called structural shock, and produces its effects on the variables of the system only through the matrix $\boldsymbol{\Phi}_{t-s}$. I can think that the structural shocks are directly related to the unrestricted VAR vector of residuals with a matrix $\boldsymbol{B}$ of restrictions, i.e.:

$$\widehat{\boldsymbol{u}}_{it}, = \mathbf{B}\boldsymbol{e}_{it} \quad (17)$$

Where $\boldsymbol{e}_{it}$ is my vector of structural shocks, i.i.d. and normally distributed. The only information set from which retrieve the matrix $\boldsymbol{B}$ is the variance-covariance matrix of residuals $\widehat{\boldsymbol{u}}_{it}$, which is not sufficient to identify the structural shocks because it is symmetric: as a consequence, I can have several matrices $\boldsymbol{B}$ respecting the equivalence in (17). In order to identify uniquely $\boldsymbol{B}$ I need $N(N-1)/2$ additional restrictions. Broadly speaking, in the literature there are two main approaches to retrieve these restrictions: one is to use the Cholesky decomposition, i.e. premultiplying (16) by the lower triangular of the $\widehat{\boldsymbol{u}}_{it}$ variance-covariance matrix, or restricting $\boldsymbol{B}$ based on economics assumptions, as in Blanchard and Quah (1989).

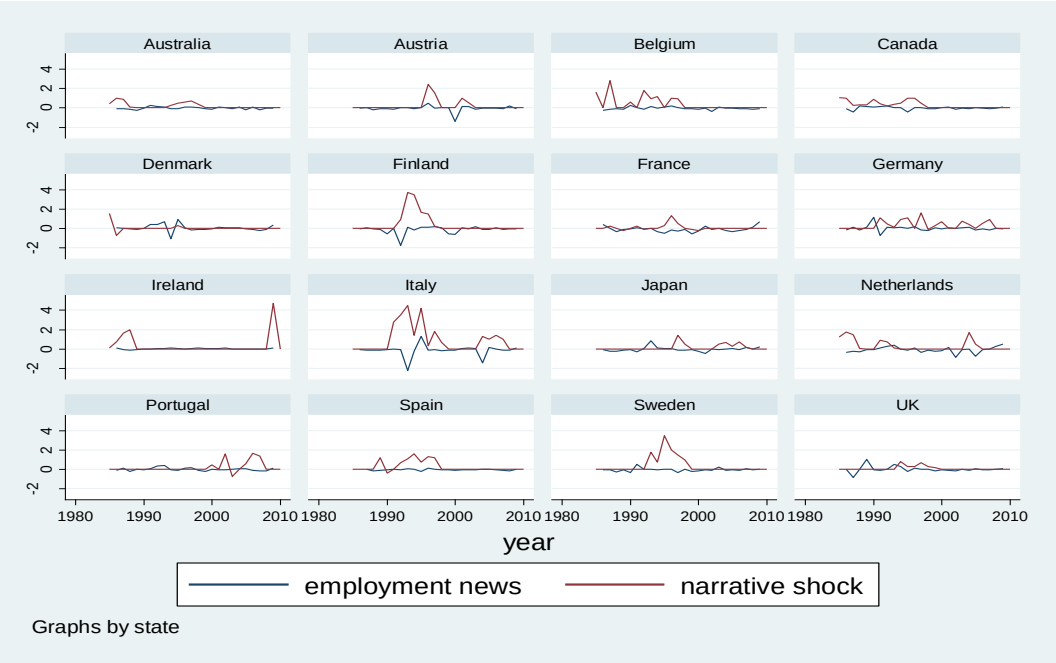
However, both techniques have drawbacks: the Cholesky decomposition is an atheoretical method but imposes a recursive form to the SVAR. As a consequence, the results will highly depend on the variables ordering. On the other hand, imposing restrictions on $\boldsymbol{B}$ using theoretical hypothesis is in contrast with the idea behind the VAR approach, which is to impose the smallest number of theoretical assumptions to the model. Moreover, as Lütkepohl (2012) pointed out, the identification method does not lead necessarily to retrieve a fundamental shock. This is because the number of variables on which

[10] Further information at the FRED webpage http://research.stlouisfed.org/fred2/categories/32262. I choose the midpoint interpretation to date a recession, which includes both the peak and the though within the recessionary period. As the St. Louis Fed reports, the dummy variable for recessions is grounded on an interpretation of the OECD Composite Leading Indicators: Reference Turning Points and Component Series data. Additional information on this indicators can be found at http://www.oecd.org/document/6/0,3746,en_2649_34349_35726918_1_1_1_1,00.html

agents form their expectations is usually much larger than the variables contained in a SVAR: therefore, the variables to which I regress the fiscal policy are not enough to clean this from all the agent expectations. In this case, the residual I get will be an anticipated shock (Mertens and Ravn 2010): the estimation of the shocks effects are biased if agents anticipate a component of the shock, and the IRF are not consistent. Lütkepohl (2012) propose two possible alternative approaches to deal with this problem: enlarging the number of variables in the VAR, or using a FAVAR.

This study explores another way to deal with this concern, which is directly related with Ramey (2011), Mertens and Ravn (2014), and Ramey and Zubairy (forthcoming), and should allow me to have more reliable estimation of the effects of a fiscal policy[11]. Following Guajardo, Leigh, and Pescatori (2013, from now on GLP), I use the dataset of predetermined changes in fiscal policy as an instrumental variable for the changes in the Cyclical Adjusted Primary Balance (CAPB) of government, which is usually the benchmark variable for the analysis on the short-term effects of fiscal policy (see Alesina and Ardagna 2010, AA from now on). In this way, the anticipated component of estimated residual in (16) should be lower respect to the one derived from the usual VAR. Then, the IRF are less biased and more reliable. Unfortunately, such a procedure implies a growth of the standard errors (since I am instrumenting a variable), leading to larger confidence intervals.

Figure 2 News in employment vs narrative shock



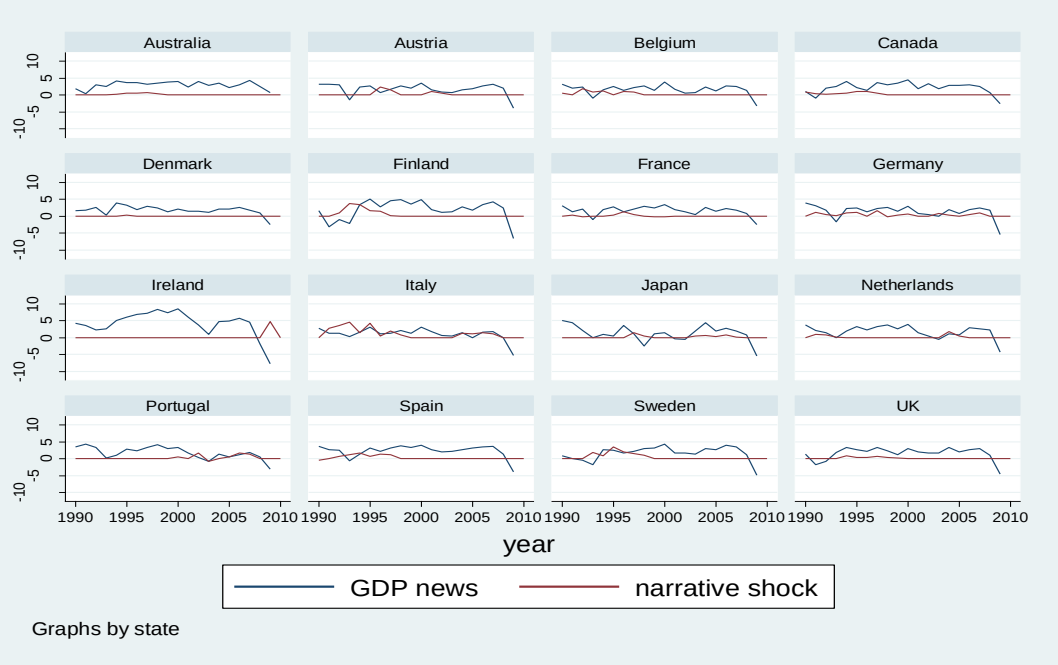
Notes. The figure reports the narrative shock measure compared with the behavior of the Employment News variable, computed as the difference between actual employment rate the forecasted level for t at t-1, and scaling the difference for the level forecasted at t-1. Forecasts are from the OECD Outlook. Data from 1985 to 2010.

Three factors assure that the residual from this methodology, and then the structural shock[12], are nearer to the forecast error of agents than other structural shock identified in the literature. First, fiscal policy can be anticipated because of the time passing between the announcement of the fiscal policy and its implementation, which usually takes two or three quarters. Therefore, the use of yearly data should avoid this type anticipation. Moreover, it is easier to predict what will happen in the next quarter, while

[11] A good review of the former methodologies to deal with the endogeneity issue to estimate fiscal policy effectiveness is contained in Guajardo, Leigh, and Pescatori (2011) and Mertens and Ravn (forthcoming).
[12] For the first variable in a ordered SVAR, shock and residual are proportional

what is going to occur next year is more uncertain. Second, my narrative variable is predetermined, since it is orthogonal respect to contemporaneous movements in output and employment. Third, the narrative variable enters in the VAR: then the shock is the residual of the change in the consolidation policy regressed for some lag of output, employment, and CAPB. This procedure gives an instrument that is uncorrelated with the previous economic behaviors. In addition, the changes in fiscal policy are usually permanent. In the case of temporary fiscal changes, the end of the consolidation policy is reported as a negative shock.

Figure 3 News in GDP vs narrative shock



Notes. The figure reports the narrative shock measure compared with the behavior of the GDP News variable, computed as the difference between actual GDP rate the forecasted level for t at t-1, and scaling the difference for the level forecasted at t-1. Forecasts are from the IMF World Economic Outlook. Data from 1990 to 2010.

Table 2

Testing the orthogonality of fiscal policy changes to news on employment rate

Equation estimated:	$\Delta F_{it} = f_i + \delta_t + \beta News_{it} + \varepsilon_{it}$			
Measure of ΔF_{it}	β	s.e.	Obs	R-squared
Narrative Fiscal Shock	-0.10	(0.07)	405	0.159
Change in CAPB OECD	1.06	(0.64)	406	0.275
Change in CAPB AA	**1.44****	(0.61)	405	0.406

Notes. The table reports point estimates and heteroskedasticity robust standard errors. All specifications contain full set of country and time fixed effects. Dateset 1990-2010
***** p<0.01, ** p<0.05, * p<0.1**

A test of the narrative variable orthogonality respect to contemporaneous movement of output and employment can be implemented constructing a measure of "news" in GDP and employment based on the contemporaneous revisions to the IMF (for GDP, data covering 1990-2010) and OECD (for employment rate, data covering 1985-2010) forecasts. The two measures for employment and GDP are compared in Figures 2 and 3. The test creates a "news" variable subtracting from time t GDP or employment rate the forecasted level for t at $t-1$, while scaling the difference for the level forecasted at $t-1$. Then, the

obtained news measure is regressed on the CAPB and the narrative shock[13]. Table 2 and 3 reports the result for this test: as it is shown, both the CAPB measure, from OECD and AA are strongly correlated with the contemporaneous output (Table 3), and with contemporaneous changes employment rate (Table 2). Hence, this preliminary analysis confirms that the changes in government budget identified by the IMF dataset are predetermined.

Table 3
Testing the orthogonality of fiscal policy changes to news on GDP

Equation estimated: $\Delta F_{it} = f_i + \delta_t + \beta News_{it} + \varepsilon_{it}$

Measure of ΔF_{it}	β	s.e.	Obs	R-squared
Narrative Fiscal Shock	-0.07	(0.07)	406	0.159
Change in CAPB OECD	**0.22***	(0.11)	322	0.304
Change in CAPB AA	**0.34*****	(0.08)	321	0.447

Notes. The table reports point estimates and heteroskedasticity robust standard errors. All specifications contain full set of country and time fixed effects. Dataset 1985-2010
***** p<0.01, ** p<0.05, * p<0.1**

In a second step of the study, I extended the analysis exploring whether the relations between fiscal policy and the economy are state dependent. In order to do that, I present a simple dynamic panel data analysis, where the fiscal policy variable, the CAPB, is instrumented with the IMF variables. In order to introduce some elements of non-linearity, I augment the model with the interaction variables between fiscal policy and the state of the economy. This extension is directly related with recent findings on the fiscal multiplier estimation (for instance, Auerback and Gorodnichenko 2012), which legitimate me to expect a remarkable difference between coefficients estimated during crises and normal times. The estimated model will be:

$$y_{it} = \sum_{s=0}^{T} \Delta g_{it-s}\alpha_{t-s} + \sum_{s=0}^{T} \Delta g_{it-s} bc_{it-s}\theta_{t-s} + \sum_{s=1}^{T} y_{it-s}\delta_{t-s} + bc_{it}\beta_1 + i_{it}\beta_2 + d_t\beta_3 + u_{it} + f_i \quad (18)$$

Each variable observation refers to a country i and a time t. In (18), y_{it} represents one of my dependent variables, while on the right hand side $\sum_{s=1}^{T} y_{it-s}$ are the s lags necessary to address the data generating process (DGP) issues, while δ_{t-s} is the coefficient specific for each lag. $\sum_{s=0}^{T} \Delta g_{it-s}$ is the fiscal policy variable and its s lags, with α_{t-s} as the time-specific multiplier. bc_{it} is the recession index, i_{it} is the short term interest rate, while β_1, β_2 are the correspondent coefficients. $\sum_{s=0}^{T} \Delta g_{it-s} bc_{it-s}$ is the interaction variable between the fiscal policy (and its s lags) and the business cycle indicator (and its s lags). I added some lags for the crossed variables between the cycle and the fiscal shock, that has coefficient θ_{t-s}. d_t are the time dummies with coefficient β_3. Finally, the individual-specific component of the error term, f_i, are added. Given that the presence of fixed effects is assumed, u_{it} is the i.i.d. part of the error.

A dynamic panel model seems to be the best option for this type of analysis because both employment rate and real per-capita GDP tend to be persistent. This property is so strong that the employment rate DGP can be thought as integrated of order 1 one for most countries (for some countries it is order two), with a high correlation to his lagged values, leading to cointegration concerns. Of course, this is not really an issue when these equations are estimated for growth rates or cyclical parts, which are usually AR(1) or AR(2) processes. This is true also for trend components – i.e. the natural employment rate and the real per-capita potential output. In order to take into account the autoregressive nature of the dependent variables, I added some lags of them to the regressors. Again, the number of lags is chosen using the Akaike Informative Criterion (AIC).

[13] A similar procedure is employed by GLP with the AA CAPB measure only for the real GDP. I did it respect to the OECD CAPB measure, obtaining similar results for the news in GDP. Moreover, I repeated the experiment for the news in employment.

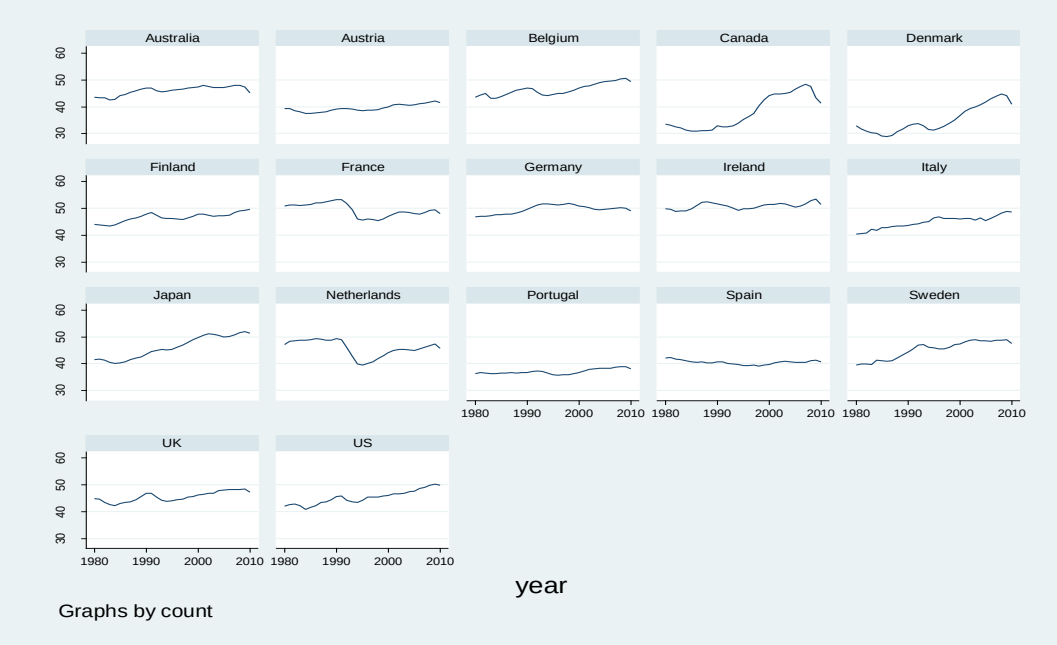
Since the classical estimator techniques for Panel data are significantly biased in presence of autocorrelation, this paper makes use of the Aurellano-Bond (1991) estimator, which is one of the most used procedures to deal with this issue. Even if it is not the most efficient estimator for panels with a short cross-sectional dimension (for instance, the Blundell and Bond (1998) estimator is more efficient), it is the one that had the best fitting and result in the diagnostic tests among the estimators generally used in the literature (Anderson Hsiao 1982, Aurellano Bond 1991, Blundell Bond 1998). Nevertheless, in small samples (with a time dimension shorter than 30 periods) the estimations would be weakly biased (Chudik, Mohaddes, Pesaran and Raissi 2013; Juessen and Linneman 2010; Judson and Owen 1999), that must be taken into account when discussing the results.

5. Results

5.1 Testing for hysteresis

A good starting point for the empirical analysis is checking whether the employment rate behavior is affected by hysteresis, since the final aim is to verify whether fiscal policy can trigger such process. Although in the literature scholars had implemented a number of tests in order to detect the presence of hysteresis in unemployment, the prevailing methodology is to test for the presence of a unit root in time-series or panel data (Song and Wu 1998).

Figure 4 Employment rate, cross-sectional units



Notes. The figure reports the employment rate behavior with the solid line for all the cross-sectional units

At a glance, the employment rate for the single cross-sectional unit (Figure 4) shows a non-stationary trend. We can divide countries in three sub-groups: the first (Belgium, Canada, Denmark, Finland, Italy, Japan, Sweden, UK, and US) recollects countries in which the employment rate rose steadily during the considered period, and one can presume the presence of a non-stationary process. The dynamic of employment rate appears to be flatter in the second group of countries (Australia, Austria, Germany, Ireland, Portugal, and Spain), therefore it is more likely that the hypothesis of unit root in the data generating process would be rejected. In France and Netherlands the behavior of the variable suggests the presence of a structural break, which would undermine the result of a unit root test (Kilian and Ohanian 2002).

Although a discussion on the characteristic and limits of a unit root test would be highly interesting, it is well above the aim of this paper. Following Leon-Ledesma (2002), I control for hysteresis presence in employment rate with a simple Im, Pesaran, and Shin (2003, from now on IPS) unit root test for panel data. In this case, the dynamics of employment will be represented with the following ADF(p_i) regression without a trend:

$$\Delta e_{i,t} = \alpha_i + \rho_i e_{i,t-1} \sum_{j=1}^{p_i} \gamma_{ij} \Delta e_{i,t-j} + \varepsilon_{i,t} \quad (19)$$

Where the subscripts refer to country i and time t, $\varepsilon_{i,t}$ is a white noise, Δe indicates the employment rate first differences, α_i the country idiosyncratic component. (19) is directly related to equations discussed in previous section, as (5): if we think that the output growth as a AR(p_i) process, its levels should follow a I(1) process. The IPS test is based on the null of non-stationarity for all countries, then $\rho_i = 0 \; \forall i$. The number of lags p_i in the ADF is chosen by maximizing the AIC for each single country. As a comparison, I tested the non stationarity also through the Levin-Lin-Chu (2002, from now on LLC) bias-adjusted test, which is a test less powerful since it assumes the same rate of convergence for each cross-sectional unit.

The result is reported in Table 4.

Table 4

Panel Unit Root test for employment rate

	Statistic	p-value
IPS	-1.8213	0.0343
LLC	-2.4177	0.0078

Notes. IPS: Im, Pesaran, and Shin test for unit root in panel data. LLC: Levin, Lin, and Chu test for unit root in panel data, bias-adjusted. All test are cross-sectional demeaned to reduce the bias induced by the cross correlation. All tests have stationarity as null hypothesis. I set for the AIC maxlag=8. Time period 1980-2010. All countries.

Not surprisingly, given the different behavior of the employment rate in my units, both the tests reject the null hypothesis that all the cross-sectional units have a unit root in the employment rate series. Therefore, to understand which units have, and which does not have, a unit root in the employment rate dynamic, I tested for non-stationarity in each single cross-sectional unit with a ADF test (the test equation is the same in (19) without the subscript i).

Table 5 shows the results of the ADF test for each single cross-sectional unit. The data reject the null of non-stationarity at the 1% for Netherlands, 5% for Canada and at 10% for Spain. Among the three countries, only the result for Spain is completely reliable. The statistical inference for the Netherlands may be affected by the presence of a structural break, while the behavior of employment rate appears highly non-linear in Canada, making the test inconsistent.

Table 5

Unit Root test for employment rate – Single Country

Country	Statistic	p-value	Country	Statistic	p-value
Australia	0.417903	0.9838	Italy	-1.11148	0.6980
Austria	-1.56772	0.4992	Japan	-2.25124	0.1883
Belgium	-1.33663	0.6147	Netherlands	-3.74093	**0.0036**
Canada	-2.88312	**0.0473**	Portugal	-0.8143	0.8146
Denmark	-2.35118	0.1560	Spain	-2.81596	**0.0560**
Finland	-1.57217	0.4969	Sweden	-1.9406	0.3138
France	-1.6634	0.4500	United Kingdom	-1.18845	0.6818
Germany	-1.4086	0.5797	United States	-2.217	0.2003
Ireland	-1.53096	0.1883			

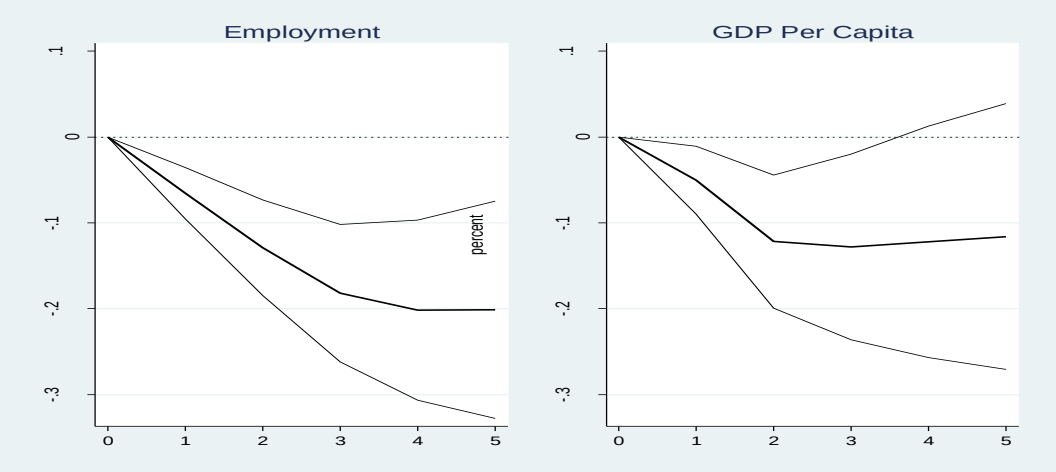
Notes. All tests have stationarity as null hypothesis. I set for the AIC maxlag=8. Time period 1980-2010

We derive two important information from this preliminary study: first, since the null of non-stationarity is strongly rejected just for one country, there is an evidence for non-stationarity in the employment rate, hence in favor of hysteresis. Second, the presence of hysteresis seems to be independent from the labor market characteristics, given that non-stationarity seems to affect employment rate behavior in USA as well as Italy, UK, and Germany. This supports the idea that a fiscal shock may affect the employment trend even independently from the labor market institutions, at least in the considered period.

5.2 SVAR Estimation

As I discussed above, this SVAR analysis focuses on the effects of a fiscal shock on the trend of the employment rate. In order to investigate such effects deeply, this study estimates also the influences of a fiscal shock on employment rate growth and on the cyclical component of the employment rate. The impulse response functions (IRF) for the employment rate and its components (trend-growth and cyclical) are compared with the IRFs for real GDP per capita (growth, potential output growth, and output gap).

Figure 5 IRF for Employment and real GDP per capita growth rates

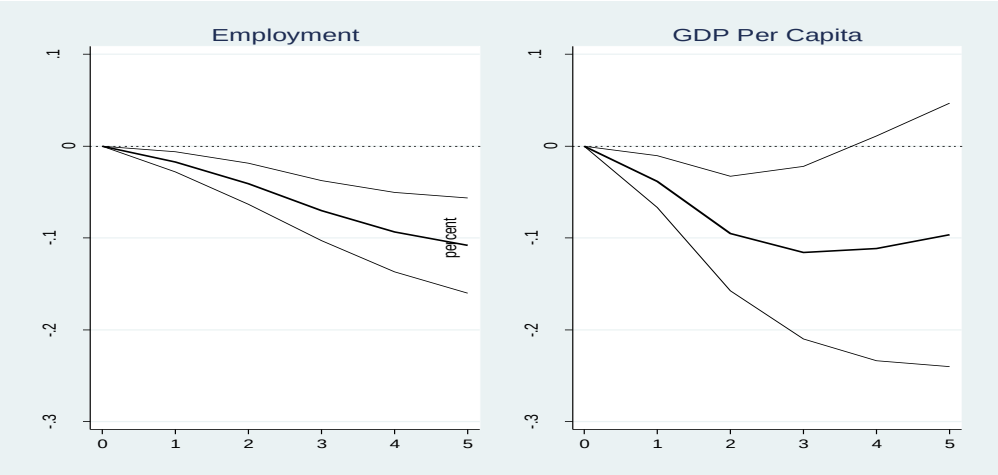


Notes. Data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contains full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

The effects of a fiscal shock on employment rate and real per capita GDP are summarized in Figures 5-7 and Table 6. In all the estimations the shock is identified with the narrative change in fiscal policy, and its normalized to be a 1% of GDP at $t = 1$. For the VAR, the AIC suggests 2 lags for both the growth rates and cyclical components, while the trend growth model requires 3 lags. In Table 6 is reported the effect of a shock after 2 periods. Since the study uses yearly data, this is a good approximation of the fiscal multiplier usually computed in the literature (it coincides with the effects of fiscal policy after 12 quarters).

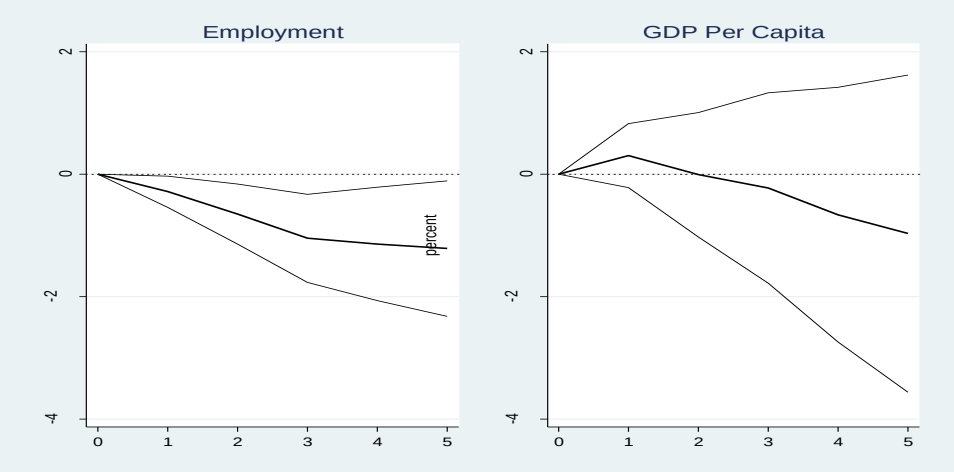
At a glance, consistently with the GLP's findings, a fiscal policy has a strong and negative impact on real per capita GDP and employment rate. This effect appears to be extremely persistent: as Figure 5 displays, there is no signal of recovering in employment growth even after four years, while the effect on GDP growth is not significant after four periods, and the point estimation stabilizes after two periods, beginning to reverse towards the mean from period three. This result is confirmed for the cyclical component of the variables (Figure 6): even in this case, while the cyclical employment keeps on reducing, the output gap starts to go back after three periods.

Figure 6 IRF for Employment and real GDP per capita cyclical component



Notes. Data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 7 IRF for Employment and real GDP per capita trend growth rates



Notes. Data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

The IRFs for the trend growths support the idea that fiscal policy triggers a hysteresis process in the employment rate independent from GDP behaviors. Figure 7 reports the results of fiscal shock for employment trend: it is strong and significant even after five years, implying that the trend of employment is not reverting to the previous equilibrium, but it is moving toward another equilibrium level. Most important, the evidence support the hypothesis that this effect is independent from the potential output dynamics: indeed, the impact of a fiscal policy shock on the real GDP per capita trend is never significant in these estimations.

A synoptic view of my results is contained in Table 6, which shows the estimated cumulative effects of the fiscal shocks after two years, together with the standard errors. The reported values are a good approximation of fiscal multiplier as it provides an easy way to compare easily my results with the ones of studies based on quarterly data. In all the estimations, the shock has a significant effect, except for the

real GDP trend growth. In particular, the implicit multiplier[14] for the GDP is -1.04 while for the employment is -1.10. The estimation of the fiscal multiplier for GDP is in the range of multipliers estimated for other studies, which do not consider state-dependency, as Blanchard and Perotti (2002) and Ramey (2011). However, it seems to be far from GLP's estimated value, which was about 1.9, and RR's one, which was about 3. In the first case, the difference is probably due to the CAPB series used: GLP uses the AA CAPB measure, while my analysis uses the OECD measure. The AA measure better isolates the larger consolidation events respect to the OECD measure, leading to higher multipliers. RR, instead, considered their narrative measure of fiscal adjustment as exogenous, i.e. they identify the fiscal policy shock with their measure of fiscal adjustment. However, as highlighted by Mertens and Ravn (forthcoming), this measure may be not completely exogenous and/or affected by measurement errors: then, their results would be biased.

The effect on employment is greater than the effect on GDP, as it was predicted in (6). This estimation implies a output elasticity to labor $1 - \gamma \approx 0.948$, which is higher than the estimated values in the literature. This results may be explained by the fact that while real GDP seems to start recovering after two periods, the employment rate keep on declining: this would lead to a larger "total" multiplier, hence to an implicit output elasticity to labor more similar to 0.65, which is the standard in level in the literature. The multipliers for the trend growth rate of employment and real per capita GDP are, respectively -0.55 (employment trend) and -0.11 (potential real GDP per capita). This means that about half of the effect on employment rate of a fiscal shock is due to movements in the trend component.

Table 6

Estimation of the effect of a 1% of GDP CAPB shock in year t=2

	Growth	Cyclical Component	Trend Growth
Employment	-1.29***	-0.41***	-0.66***
	(0.34)	(0.14)	(0.25)
GDP	-1.22***	-0.95***	-0.13
	(0.47)	(0.38)	(0.55)

Notes. The table reports point estimates with heteroskedasticity-robust standard errors in parentheses obtained via delta method. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy, and its normalized to be a 1% of GDP at $t = 1$.
***** p<0.01, ** p<0.05, * p<0.1**

Some robustness exercises are reported in the Appendix. The results for employment rate are robust to changes in the number of lags, to the use of potential output as denominator, and to a restriction in the considered shock – I take into account only "large" shocks (>1.5% GDP) – which are supposed to be more expansionary (Giavazzi and Pagano 1996). The results for output seem to be more sensitive to those changes, in particular for output gap component. In addition, following Turrini 2013, I split my dataset between countries with a high level of employment protection and with a low level of employment protection[15]. In this case, only the estimation for the low protection countries confirm the results presented here. This suggest that the labor market institution may interfere with the transmission of fiscal shocks.

5.3 Extensions

The effect of composition

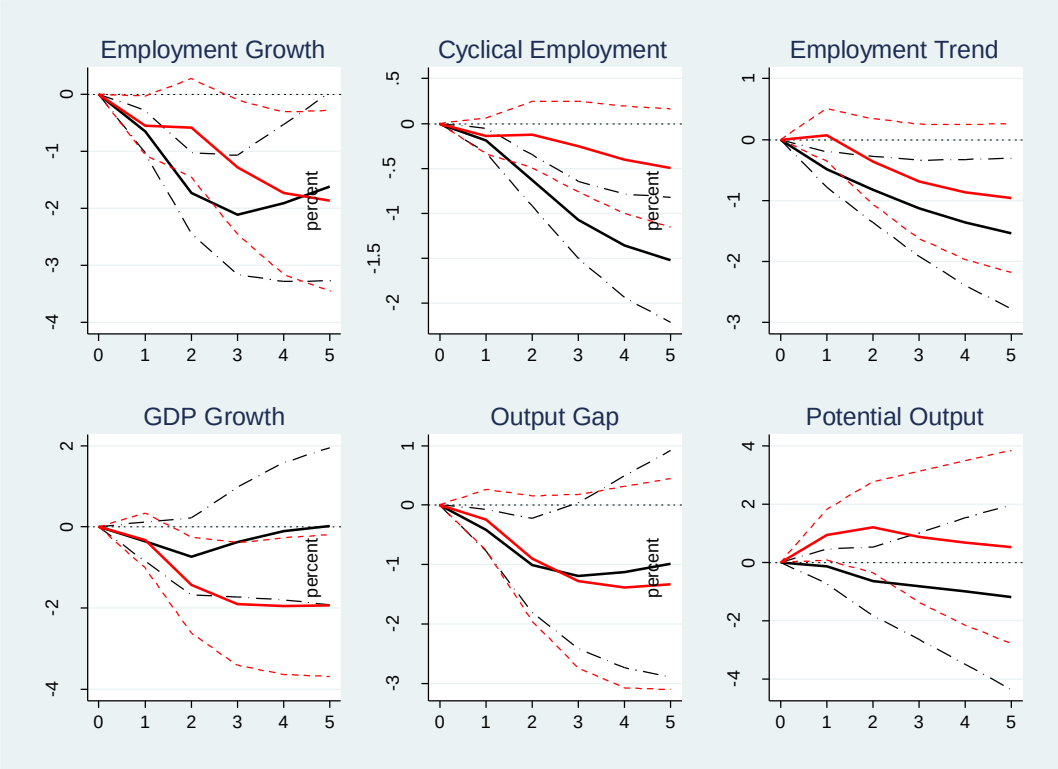
I now examine the effect of a fiscal policy shock disentangling the changes in expenditure from the changes in taxation. I defined a shock to be "taxation" or "expenditure" if the tax raise or the spending

[14] The multipliers are computed dividing the cumulative effect on the variables for the change in the CAPB, which is 1.17% for growth rates and 1.20% for trend growth. Thus, the fiscal multiplier after two years are -1.04 (-1.29/1.17) for the employment rate, -1.04 (-1.22/1.17) for the GDP, -0.55 (-0.66/1.20) for the employment trend, and -0.11 (-0.13/1.20) for the potential output.

[15] In order to divide my panel, I considered the OECD indicators of employment protection: when a country is above the mean of the whole panel, I consider that as highly protected. If the evidence is mixed – as, for instance, for Finland – I considered other variables as the level of minimum wage over the median or the protection of temporary jobs.

cut, respectively, were greater than half of the overall fiscal policy. The values of tax raising and spending cuts are reported in the Appendix.

Figure 8 Effects of public expenditure cuts (black line) and taxation increases (red line)



Notes. Data are for all 17 countries, period 1980-2009. Shocks on both public expenditure (black) and tax level (red) are normalized to be 1% of GDP. The figure reports point estimates and 90% confidence intervals, in red dashed lines for taxation and black dash-point lines for expenditure. All specification contain full set of country and time fixed effects. The shocks are identified with the narrative change in fiscal policy.

Figure 8 depicts the IRF for employment (upper three panels) and real per capita GDP (lower three panels). Red solid lines are the point estimation for taxation shock, while black solid lines are the point estimation for the public expenditure shock. All the shocks are normalized to be a 1% of GDP deviation. The specification is a VAR(2) for cyclical component and overall growth and VAR(3) for trend growth. The expenditure cut measure is ordered first in the VAR, while taxes are ordered second[16], since the level of revenues may react immediately to a public expenditure shock, while the effect of an increase in taxation on public expenditure should take at least one period.

The estimations suggest that a reduction of public expenditure has a larger effect on employment rate compared with an increase of taxation, while a change in taxation has a stronger effect than expenditure on output dynamic. We can find a similar trend also for persistency: usually a cut in expenditure affects employment longer, and GDP recovers faster, than when a taxation shock takes place. The evidence for employment rate growth is more mixed, since, even if the expenditure shock has a larger effect on impact, its persistence is lower than taxation. Both the shocks are not significant when I consider potential output, while only expenditure is significant for employment trend. Usually the effects of taxation suffer of a large volatility compared with expenditure.

The results for the real GDP are perfectly in line with a huge literature on the effects of fiscal policy: recent studies, as Barro and Redlick (2011) and Forni, Monteforte, and Sessa (2009), suggested that the

[16] An experiment with a different order of variables is in the Appendix. There are not remarkable differences when the point estimation is significant.

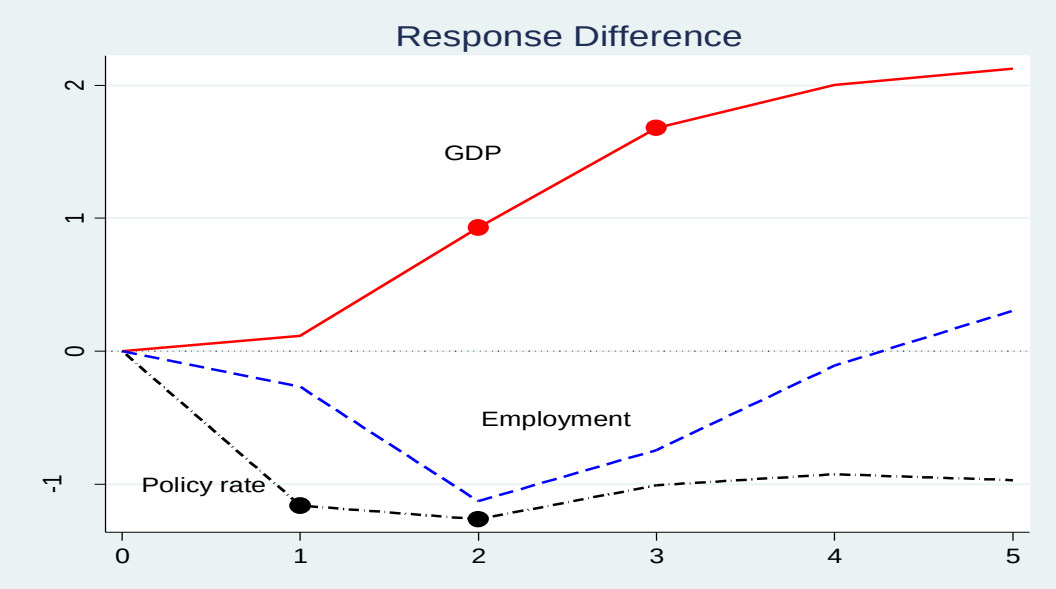
taxation shock multiplier should be larger than the spending shock one, because of a smaller crowding-out effect, and a larger effect on the investment (and saving) decision of private agents. Moreover, according to Blanchard and Summers (1987a), a tax increase, especially if focused on the tax wedge, should affect also the supply side, driving both the aggregate demand and supply on a lower level of output.

Nevertheless, according with this hypothesis I would expect a stronger, or at least more prolonged, effect of taxation also on employment. Instead, Figure 8 suggests that not only expenditure has a stronger effect on employment growth, but also it is persistent as taxation shock, having a significant effect even on the employment trend – while taxation is not significant –. The explanation of such result may be that, since the shock is permanent, a spending cut implies a reduction in public employment. The fired (or not hired) public workers are absorbed by the private sector only in the long-run, given that the skill they need to get a job in the private sector may not match with the ones that they have (a teacher has to acquire new skills to work in a firm). However, if this is true, output should show a response to expenditure cuts more prolonged than the one to tax increases. Therefore, the effect on public employment does not offer a solid explanation of the different effects of taxation and spending on employment rate and real GDP per-capita.

The effect of monetary policy

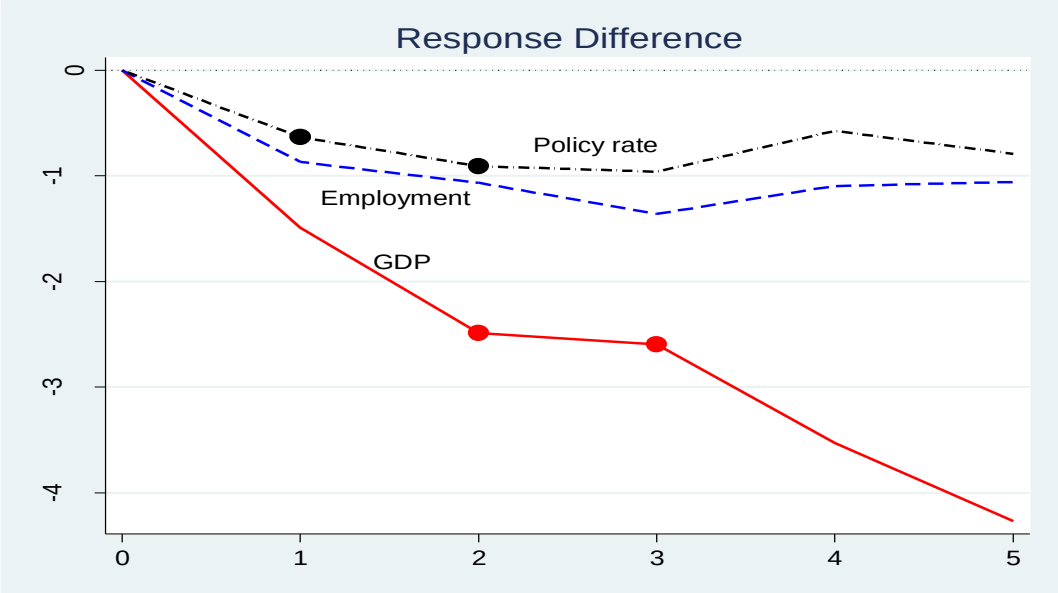
The different reactions of output and employment to fiscal policy components may result from the conduct of monetary policy. The idea is that monetary policy reacts stronger to a spending cut than to a rise in taxation, since monetary authorities interpret the former as a stronger signal of commitment to fiscal discipline. Implementing a policy more expansionary, the monetary authority may partially offset the negative effects of the fiscal consolidation. If it is the case, the economy activity will recover faster, while the employment may be sluggish or even decreasing, since the level of growth above which the private sector starts to hire is evaluated to be about 2% a year. In addition, as I have highlighted before, fired workers (or not hired) from public employments need a larger time to find new jobs in the private sector because the required skills may not match.

Figure 9 Difference between spending and taxation shock effects – growth rates.



Notes. Data are for all 17 countries, period 1980-2009. The figure reports the differences in the effect of tax increases and spending cuts: with a red solid line for real per-capita GDP, a blue dashed line for employment, and a black point-dashed line for the monetary policy rate. Shocks on both public expenditure (cut) and tax level (increase) are normalized to be 1% of GDP. All specification contain full set of country and time fixed effects. The shocks are identified with the narrative change in fiscal policy. Large dots indicate statistically significant difference (p-value less or equal 10%).

Figure 10 Difference between spending and taxation shock effects – long-term.



Notes. Data are for all 17 countries, period 1980-2009. The figure reports the differences in the effect of tax increases and spending cuts: with a red solid line for real per-capita GDP, a blue dashed line for employment, and a black point-dashed line for the monetary policy rate. Shocks in both public expenditure (cut) and tax level (increase) are normalized to be 1% of GDP. All specification contain full set of country and time fixed effects. The shocks are identified with the narrative change in fiscal policy. Large dots indicate statistically significant difference (p-value less or equal 10%).

Following GLP, I controlled the behavior of monetary authority adding the policy interest rate to my VAR specification. The results are reported in Figures 9 and 10, that show the differences in the effect of the two policies for both the short term (Figure 9) and the long term (Figure 10). A positive value of the difference implies a larger effect of taxation compared to expenditure, a negative value a larger effect of spending shocks. The output suggests that the reaction of the monetary authority is different between the two policies, with an expansionary monetary policy following a cut in public expenditure (black point-dashes line). This result is strong and significant for two periods, as the dots indicate: hence, monetary authority tends to be more expansive when the consolidation is implemented cutting public expenditure, contrasting efficiently the drop in output, but not in employment rate.

As Figure 10 shows, the change in monetary policy appears to alter the predominance of the effects of a spending cut on the long-term employment rate and to have little and delayed effects on the potential output. However, since the effects of both expenditure and taxation are not significant for the potential output, this latter result should be inconsistent (and this is true even if the difference is statistically significant).

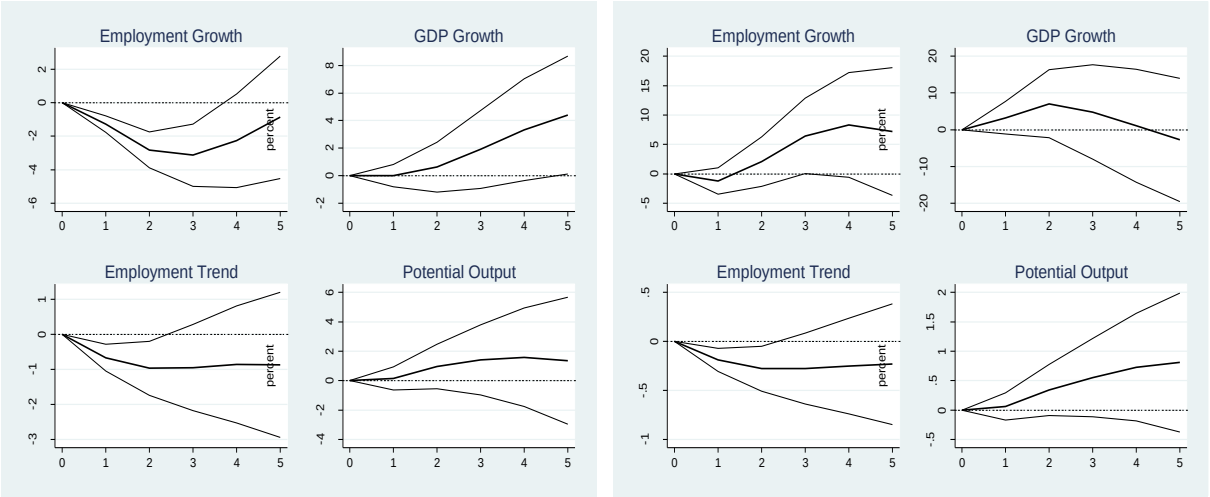
The Euro-Area after Maastricht

Figure 11 reports the effect of a fiscal shock in the Euro Area (EA) after the sign of Maastricht Treaty (MT), and in Non Euro-Area (NEA) countries during the same period (1992-2010). The Figure displays three results: first, the evidence confirms that fiscal policy affects the employment trend without affecting the potential output in both subgroups. Second, fiscal policy does not modify significantly the GDP growth in both subgroups, as predicted by the theories on expansionary austerity. Third, since a fiscal policy impacts only marginally the employment rate in the NEA countries, while the effect is strongly negative within the EA, the post-fiscal shock employment growth is puzzling: such a behavior confirms the evidence of the literature on jobless recovery (Galì, Smets and Wouters 2012; Gordon 2010; Riggi 2010; Shimer 2010).

The second result contrasts with previous findings, where output growth reacts negatively to a fiscal shock. The change of sign probably arises from the general reduction of interest rates occurred in Western Countries during the '90s – reduction that happened also because of the presence of a wide-spread

expansionary monetary policy –, which may have sterilized the negative effects of consolidation fiscal policy. According to this hypothesis, the larger positive influence of fiscal consolidation for the EA arises from the signing of the MT, considered a credible commitment. The different behavior of employment rate can be explained with the role of labor market institutions for monetary policy effectiveness. In NEA countries – where the protection level of labor market is usually low – fiscal policy does not affect the employment rate, while it has a strong negative influence in the EA countries – where the protection of jobs is higher. Therefore the more the labor market is protected, the less monetary policy is able to boost employment recovery.

Figure 11 Euro-Area (Left Panel) and Non-Euro Countries (Right Panel) effects of a fiscal shock after 1992.



Notes. Data are for all 17 countries, period 1992-2009. The fiscal shock is normalized to be 1% of GDP. The figures report point estimates and 90% confidence intervals. The shock is identified with the narrative change in fiscal policy. Fixed effects and time dummies added.

Adding non-linearities

Table 7 summarizes the estimations on the effects of fiscal policy on output considering that these effects may vary along the business cycle. In order to detect the behavior of the fiscal multiplier during booms and busts, the Aurellano-Bond (1991) estimator was selected. The role of the business cycle is evaluated using the NBER based dummy from the FRED database, which takes value equal one when a crisis occur, and zero in normal times. The multidimensional nature of the links between fiscal shocks and business cycle has been taken into account by creating interaction variables between shocks and business cycle.

The findings confirm that, in normal times, a fiscal shock has negative effects on employment and GDP, and on their components, with a larger and more significant effect on the employment rate. However, when a consolidation policy is implemented during recessions, its effects seem to be stronger and more protracted for growth rates and trends of variables. However, the impact of fiscal consolidation on the cyclical component seems to reduce during crises. This picture is perfectly summarized by the long-term multiplier, which is reported after the estimations of the single coefficients: in all the regressions the multiplier during crises is larger, but not for the cyclical components, where the multipliers decreases. The increase in fiscal policy effectiveness is particularly ample for the employment trend, which shows a positive long-term multiplier in normal times, which turns strongly negative during crises.

This larger effect of fiscal policy during crises is an expected result and is in line with a sizeable literature on the fiscal multiplier state dependency (Auerback and Gorodnichenko 2012; Baum, Popolaski-Ribeiro, and Weber 2012; Corsetti, Meier and Muller 2012; Michaillat 2012a/b, Ramey and Zubairy, forthcoming). The fact that a fiscal shock may reduce its effectiveness on the cyclical component of

variables during crises would be explained by the stronger effect on the trend of those variables. To clear it in your mind, try to consider two shocks with the same effect on the employment rate, call them a and b: if a affects the trend of the variable more than b, the estimated effect of a on the cyclical employment will be lower than b, since the overall effect must be the same. In my case, even if the overall effect of GDP and employment is larger during recessions, the influence on trends of the variable is strong enough to reduce the impact on the cyclical components.

Table 7

Estimation of fiscal policy effects controlling for non-linearities

VARIABLES	Employment Rate Growth	GDP Growth	Cyclical Employment	Output Gap	Trend Employment	Potential Output
Fiscal Policy	**-0.764****	-0.233	**-0.199***	-0.217	-0.221	-0.267
	(0.342)	(0.216)	(0.115)	(0.181)	(0.154)	(0.258)
t-1 Fiscal Policy	0.155	0.078	-0.123	0.111	0.124	-0.133
	(0.368)	(0.267)	(0.123)	(0.211)	(0.211)	(0.391)
t-2 Fiscal Policy	0.436	0.194	0.017	0.075	0.185	0.001
	(0.320)	(0.239)	(0.113)	(0.207)	(0.194)	(0.398)
t-3 Fiscal Policy	0.066	-0.150	-0.136	-0.199	0.170	-0.250
	(0.330)	(0.287)	(0.120)	(0.216)	(0.155)	(0.391)
Fiscal Policy * Recession	0.103	0.239	-0.028	0.086	-0.108	0.656
	(0.626)	(0.309)	(0.203)	(0.224)	(0.381)	(0.474)
t-1 Fiscal Policy * Recession	-0.067	-0.384	0.203	-0.261	-0.247	-0.386
	(0.389)	(0.274)	(0.132)	(0.203)	(0.215)	(0.405)
t-2 Fiscal Policy * Recession	**-0.596***	0.166	0.100	0.290	**-0.298***	-0.073
	(0.312)	(0.246)	(0.121)	(0.224)	(0.171)	(0.401)
t-3 Fiscal Policy * Recession	-0.428	-0.082	0.009	0.051	-0.295	0.367
	(0.416)	(0.319)	(0.143)	(0.263)	(0.219)	(0.402)
t-1 Dependent	**0.614*****	**0.589*****	**0.692*****	**1.129*****	**0.604*****	**0.760*****
	(0.096)	(0.054)	(0.116)	(0.055)	(0.076)	(0.044)
t-2 Dependent	-0.099		-0.135	**-0.503*****		
	(0.105)		(0.088)	(0.062)		
Business Cycle	**0.519***	**-1.216*****	0.146	**-0.731*****	0.207	-0.285
	(0.265)	(0.176)	(0.090)	(0.171)	(0.140)	(0.241)
long term multiplier	-0.22	-0.27	**-0.99***	-0.62	0.65	-2.71
(se)	(1.29)	(1.11)	(0.57)	(1.05)	(1.07)	(2.35)
long term multiplier crises	-0.44	-0.42	-0.36	-0.18	-1.74	-0.358
(se)	(2.58)	(0.71)	(0.47)	(0.68)	(1.25)	(1.99)
Observations	451	451	451	451	451	451
R-squared	-0.05	0.67	0.41	0.77	0.15	0.682
Countries	17	17	17	17	17	17

***, **, *** denote statistical significance at the 10, 5, 1 per cent level respectively. Standard errors are reported in brackets.**

Specification. All regressions include country and year fixed effects. using 451 observations. 17 cross-sectional units are included. Time-series length: minimum 23, maximum 27, starting 1980 and ending 2010. Estimation method. 1-step dynamic panel (Arellano Bond 1991). The fiscal policy shock and its lags are considered as exogenous and used as instruments.

Legend. Employment Rate Growth: the dependent variable is the growth of employment rate; Cyclical Employment: the dependent variable is computed as the difference between the actual employment rate and the NAIRE; Trend Employment: the dependent variable is the growth rates of my NAIRE; GDP Growth: the dependent variable is the growth rate of real GDP per-capita; Output Gap: the dependent variable is the output gap; Potential Output: the dependent variable is the growth rate of potential GDP computed from output gap and real GDP.

6. CONCLUSIONS

This study covers some open issues within the literature on the fiscal multiplier, focusing on the impact and the persistency of a contractionary fiscal policy shock on the job creation process, and discussing the presence of a hysteresis process in the employment behavior. The general relation between fiscal shocks and employment rate (the so-called "fiscal multiplier"), the short-run relation (the so-called "Okun's law"), and the long-run relation (the so-called "hysteresis"), is analyzed via a SVAR estimation. The study also investigates whether taxation and expenditure have different effects on the economy, evaluates the role of monetary policy, and controls the relation between fiscal shocks and business cycle. The results on employment are compared with the ones for real per capita GDP in order to understand to which extent

those effects are different from the one on employment, with particular attention to the presence of hysteresis in employment rate.

The study verifies the presence of hysteresis in employment rate with a unit root test. In agreement with Blanchard and Summers (1986, 1987a 1987b) and Delong and Summers (2012), the analysis found evidence in favor of the presence of a hysteresis process. Then, a Panel SVAR was estimated exploiting a new methodology to identify shocks, similar to the one of Guajardo, Leigh, and Pescatori (2014), Ramey (2011), and Mertens and Ravn (2013 and forthcoming). This methodology consists in two steps: first, by demeaning each cross-sectional unit the analysis can deal with panel data as a unique time-series of 527 observations from a single country. Second, the analysis used the dataset of predetermined changes in fiscal policy as an instrumental variable for the changes in the Cyclical Adjusted Primary Balance (CAPB) of government, which is usually the benchmark variable for the analysis on the short-term effects of fiscal policy.

The IRFs suggest that fiscal policy may affect employment trend without modify the potential output behavior. Hence, a fiscal policy shock triggers a hysteresis process in employment, having a highly persistent effect on the job creation process. As a consequence, the fiscal policy may affect the equilibrium level of employment, and statistical inference based only on the analysis of employment cyclical component may be biased because of the employment trend movements. Surprisingly, my data suggest that a change in public expenditure is more likely to produce hysteresis than a shock in taxation, which affects more the potential output. Such a result cannot be totally explained considering both that expenditure directly affect employment – since a large number of workers are employed in public institutions – and that those shocks are permanent.

Instead, the evidence advocates that a possible explanation of lower responsiveness of GDP to an expenditure cut – compared with the effectiveness of tax increases – is that monetary authority reacts differently to a consolidation obtained cutting expenditure respect to one achieved raising tax. As a matter of fact, the study investigates to what extent the reaction of monetary policy is different between the two types of fiscal shock, finding out that monetary authorities implement a policy more expansionary after a cut in expenditure. Such reaction seems to reduce the effects of expenditure cuts on both real GDP growth and employment trend. This result is in line with a sizable literature, which suggests that central bankers will implement a more expansionary policy when the consolidation is obtained via a spending cut, as they believe that this fiscal policy implies more commitment from the government.

The estimations for fiscal multipliers are in line with the literature: I found an overall fiscal multiplier of -1.04 for the real per capita GDP and of -1.10 for the employment rate: has expected the effects on GDP are smaller than the ones on employment. The fiscal multiplier for employment trend is -0.55, while is -0.11 for potential real GDP per capita. Therefore, the impact on the employment trend accounts for almost one-half of the multiplier for the overall employment: such a result implies that the inference obtained taking into account only the cyclical component is misleading.

The role of business cycle is investigated by employing dynamic panel regressions. The findings are mixed: when a crisis occurs, the multipliers for the growth rates and the trend spike, while the opposite is true for the cyclical component. This happens because the change in the equilibrium level of real GDP and employment due to fiscal shocks is large enough to reduce the estimated impact of fiscal policy on the cyclical components. This evidence partially confirms the recent literature on the fiscal multiplier (Auerback and Gorodnichenko 2012; Baum, Popolaski-Ribeiro, and Weber 2012; Corsetti, Meier and Muller 2012; Michaillat 2012a/b). When I considered a smaller dataset, i.e. the after-Maastricht period for both the Euro-Area and Non-Euro countries, the ability of fiscal policy to produce a hysteresis process is confirmed. However, the presence of different reactions between the subgroups to a fiscal shock of output growth and employment rate growth, suggests that the role of monetary policy and interest rate, together with labor market institutions, may be crucial. This effect should be deep by future researches.

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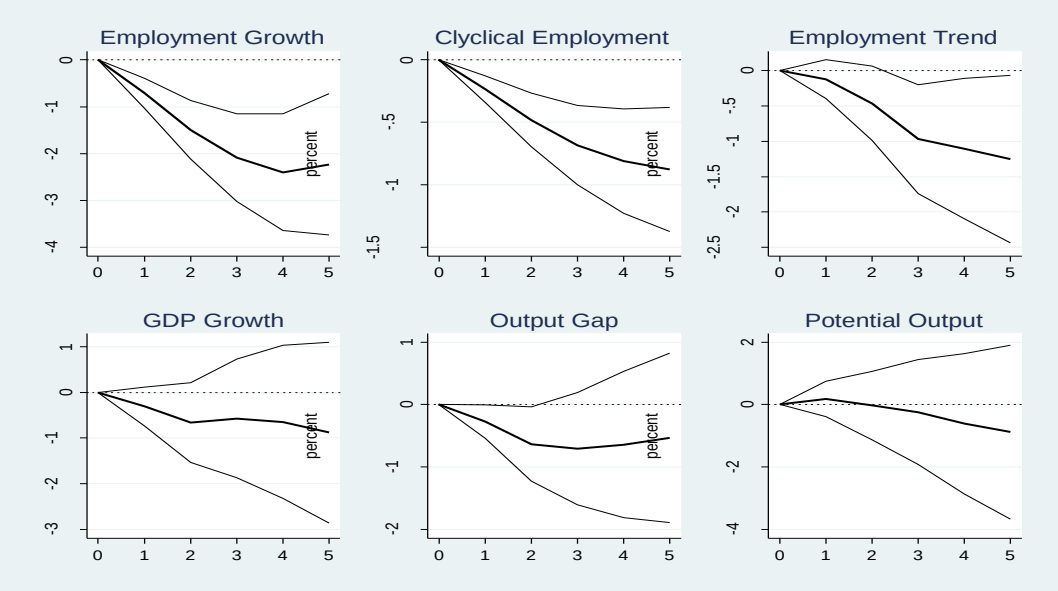
APPENDIX

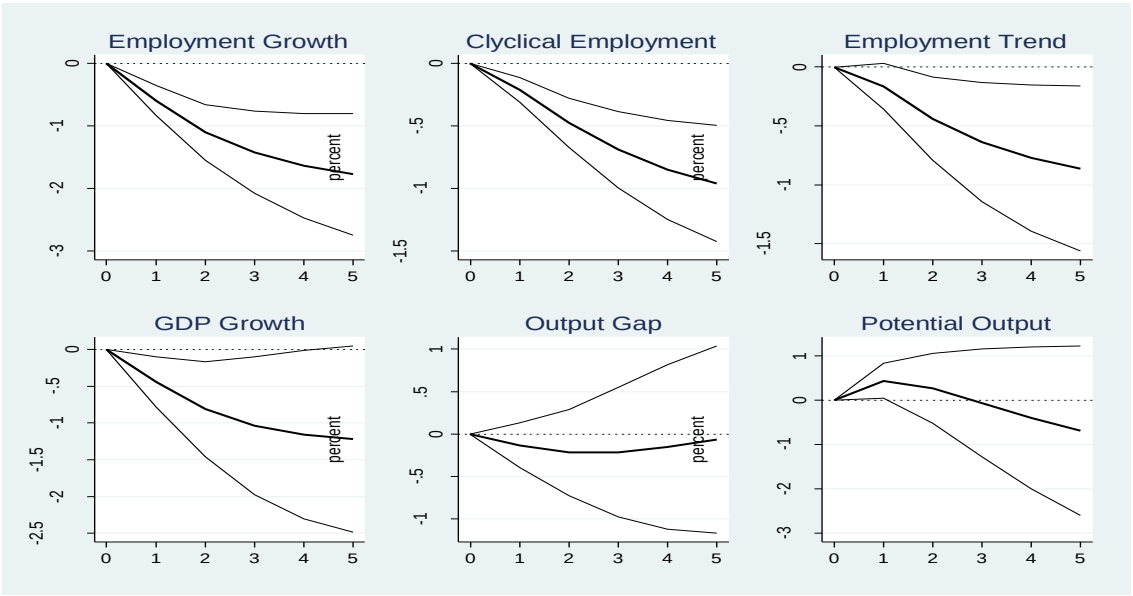
ROBUSTNESS

Figure 12 IRF Large Consolidations (>1.5% GDP)



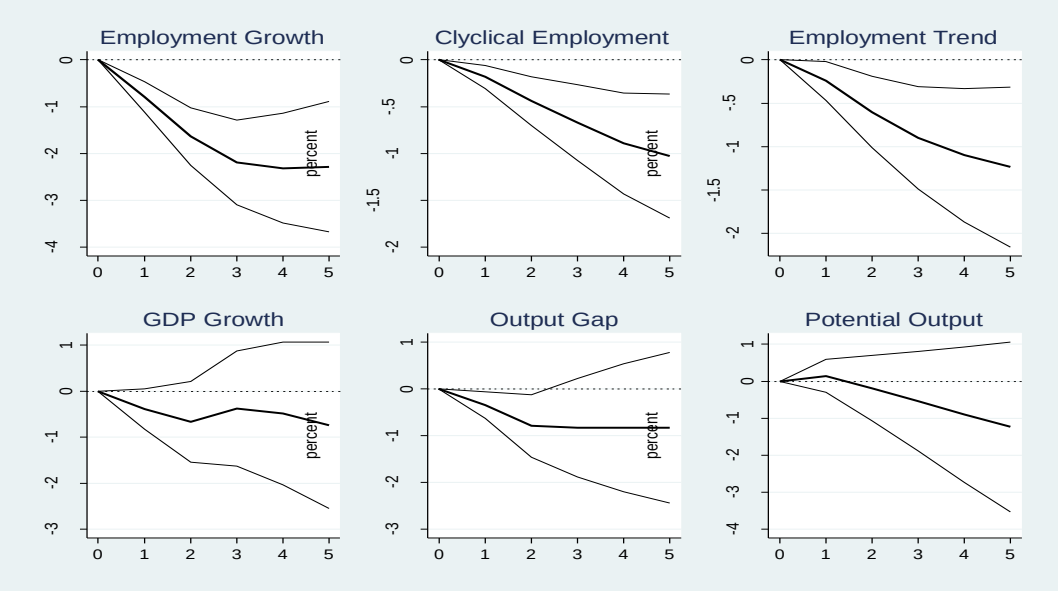
Notes: data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy, considering only consolidation larger than 1.5% GDP, following Giavazzi and Pagano 1990 [expected to be more expansionary].

Figure 13 IRF for Employment and real GDP – 1 Lag



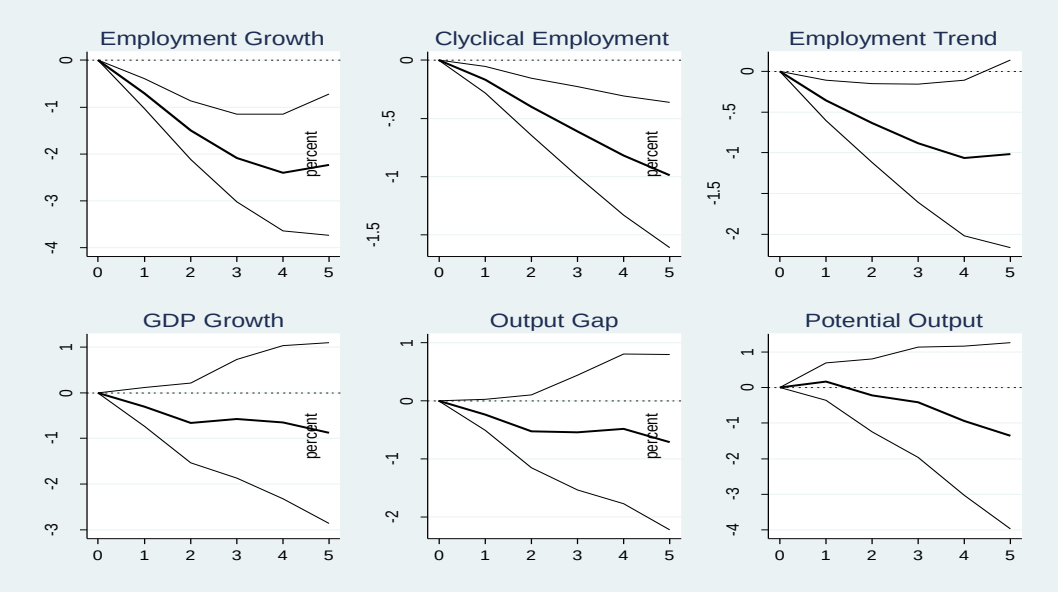
Notes. Data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 14 IRF for Employment and real GDP – Growth and Cyclical VAR(3); Trend VAR (2)



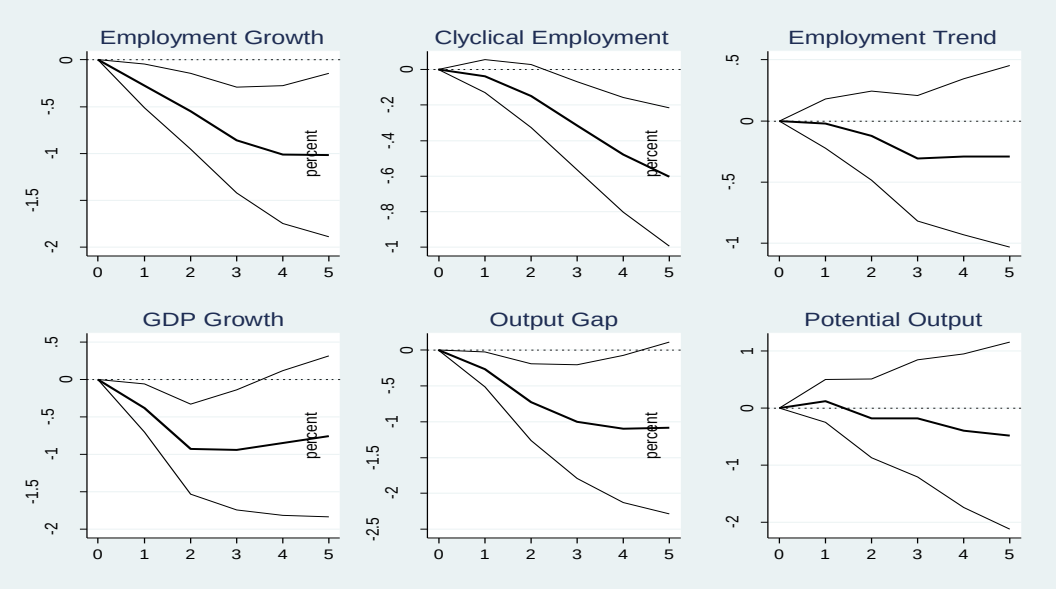
Notes: data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 15 IRF for Employment and real GDP – 4 lags



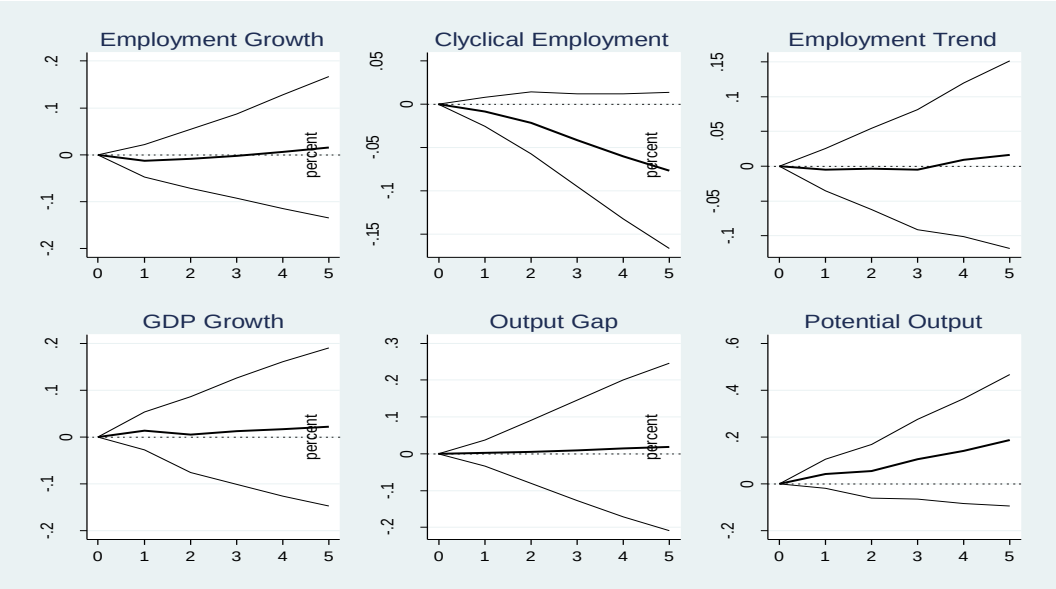
Notes. Data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 16 IRF for Employment and real GDP Excluding Ireland and Germany



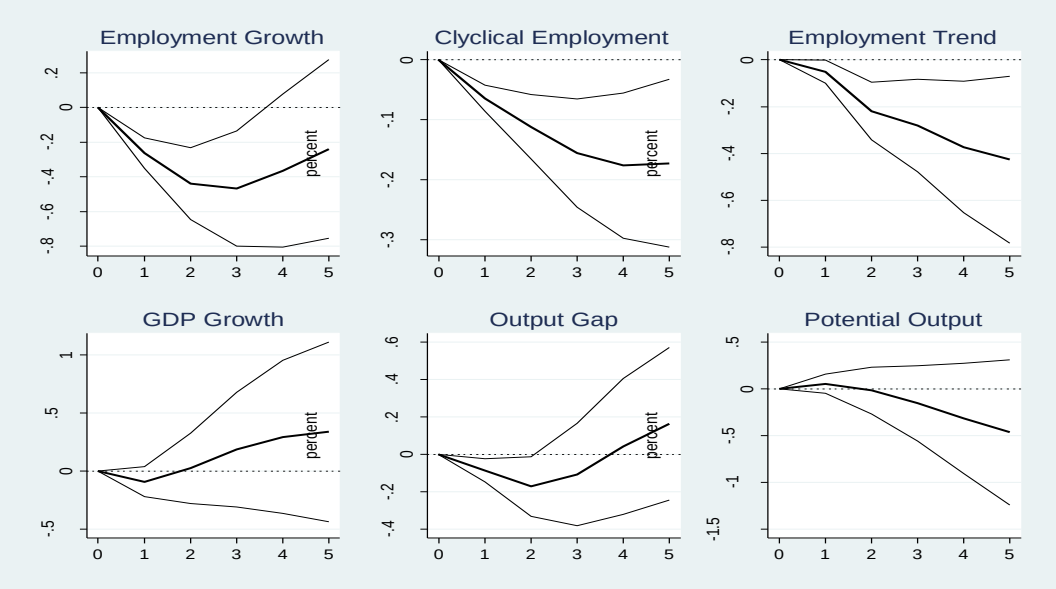
Notes. Data are for 15 countries, period 1980-2009. I excluded Germany and Ireland. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 17 High Employment Protection Level



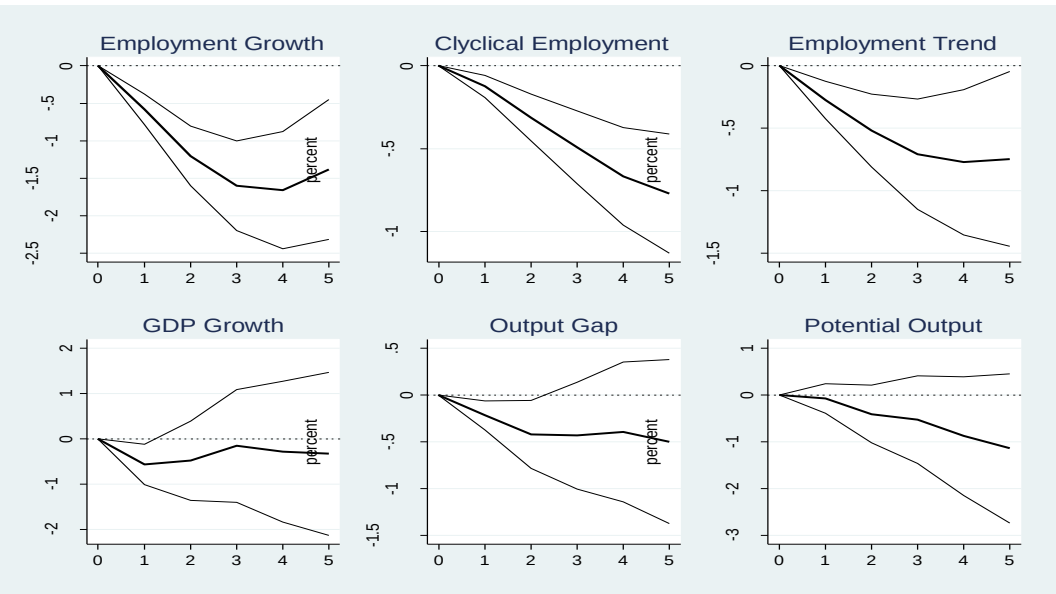
Notes. Data are for high employment protection level countries [Austria, Belgium, France, Finland, Germany, Italy, Netherlands, Portugal, Spain, Sweden], period 1985-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 18 Low Employment Protection Level



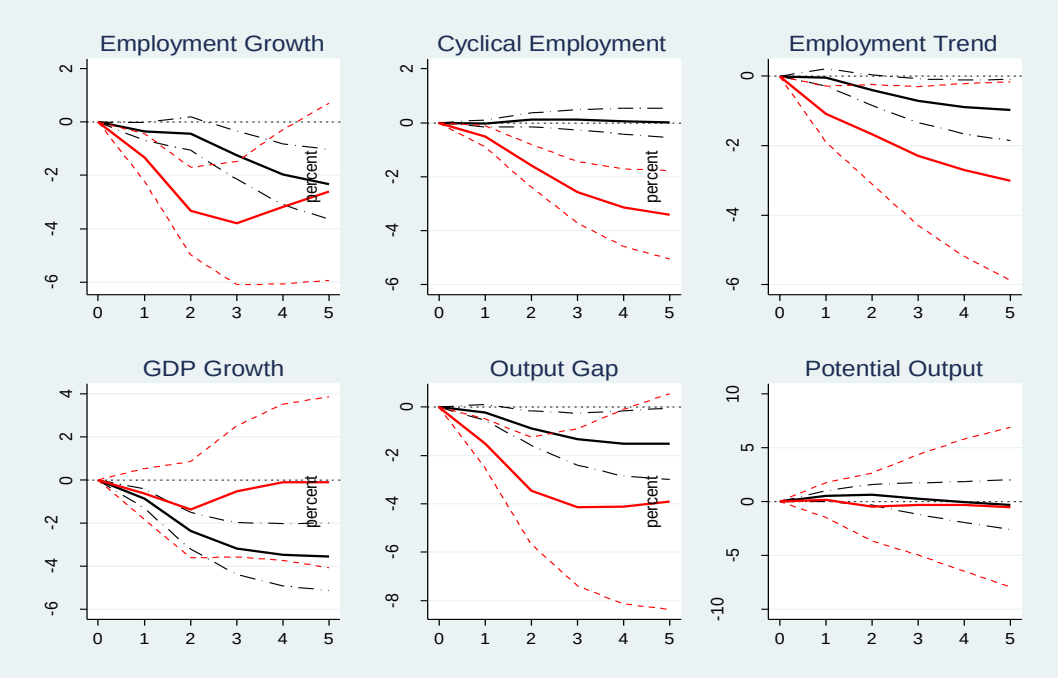
Notes. Data are for low employment protection level countries [Australia, Canada, Denmark, Ireland, Japan, UK, US], period 1985-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals. All specification contain time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 19 IRF with Potential Output as Denominator



Notes. Data are for all 17 countries, period 1980-2009. Effect of a raise in CAPB of the 1% of GDP. The figure reports point estimates and 90% confidence intervals, in red dashed lines for taxation and black dash-point lines for expenditure. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

Figure 20 Effects of public expenditure changes (red line) and taxation changes (black line) – Different ordering of variables



Notes. Data are for all 17 countries, period 1980-2009. Shocks in both public expenditure (red) and tax level (black) are normalized to be 1% of GDP. The figure reports point estimates and 90% confidence intervals, in red dashed lines for expenditure and black dash-point lines for taxation. All specification contain full set of country and time fixed effects. The shock is identified with the narrative change in fiscal policy.

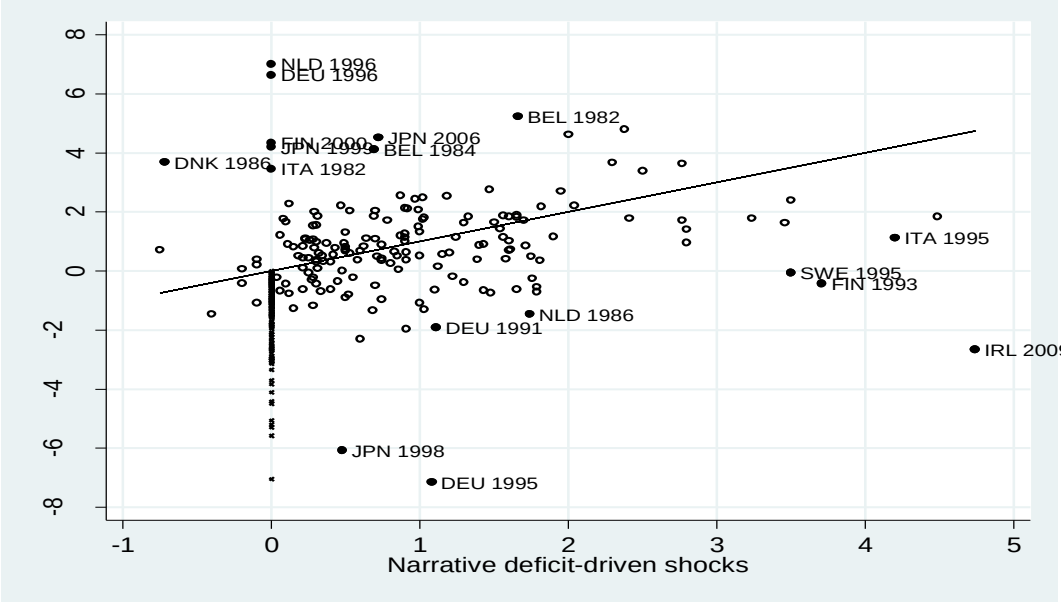
DATASET

The database, which is reported above, identifies fiscal consolidation measures examining policymakers' intentions and actions as described in contemporaneous policy documents, recognizing the measures motivated primarily by deficit reduction. As GLP explained: "(…) such fiscal actions represent a response to past decisions and economic conditions rather than to prospective conditions. As a result, they are unlikely to be systematically correlated with other developments affecting output in the short term, and are thus valid for estimating the macroeconomic effects of fiscal consolidation"[17]. As the authors argue this avoids the large part of the problems related to the identification of fiscal policy consolidation using a statistical concept such as the increase in CAPB[18]. Figure reports the relation between the change in CAPB and the GLP measure of fiscal policy, while it is compared to OECD CAPB in Figure 21.

[17] The historical sources examined by the authors include Budget Reports, Budget Speeches, central bank reports, Convergence and Stability Programs submitted by the authorities to the European Commission, IMF reports and OECD Economic Surveys. In addition, country-specific sources are examined, such as the Congressional Budget Office (CBO) reports and the Economic Report of the President for the United States, the Journal Officiel de la Republique Francaise for France, Ministry of Finance press releases and publications, and, in one case, and a transcript of a television interview. These documents provide evidence of what policymakers believed at the time that decisions were taken, as well as the budgetary impact of the measures. Based on this approach, the sample includes 173 fiscal policy adjustments in 17 OECD economies between 1978 and 2009, reported in percentage change of public expenditure and/or taxation respect to GDP. The data are presented at an annual frequency. The countries included in my sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, the United Kingdom and the United States.

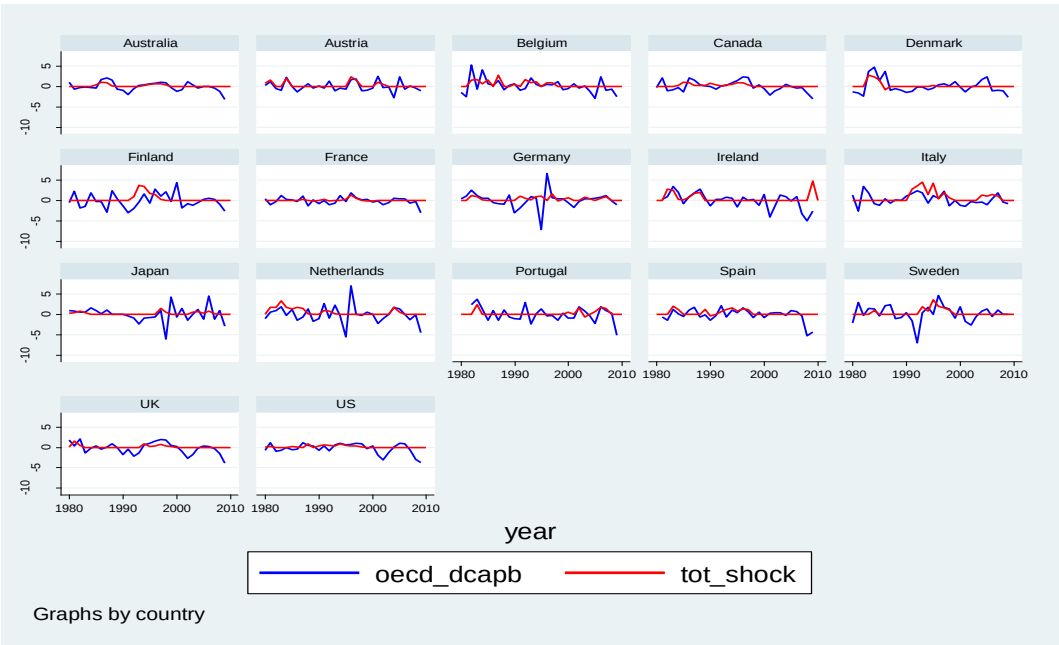
[18] For a comparison between this dataset and the CAPB, see Guajardo Leigh and Pescatori 2013

Figure 21 Difference in change in OECD CAPB VS GLP Measure of Narrative Shocks



Notes. Figure reports difference the two measure of change in fiscal policy in a scatter plot. In the figure, is selected the component of OECD CAPB directly related to a fiscal consolidation, and the principal discrepancies between the two measure are reported. This figure is directly related to the GLP one which reports the main discrepancies with the AA CAPB measure

Figure 22 Narrative measure and OECD CAPB



Notes. Figure reports the two measure of change in fiscal policy for each cross-sectional observation.

The use of a narrative-based dataset raises two important concerns. Primarily, as highlighted by Cloyne (2013), this dataset appeals to the Romer and Romer (2010, RR)'s argument that actions to contrast deficit or reduce public debt are exogenous. However, not all these types of actions are truly exogenous: indeed the UK data collected by Devries, Guajardo, Leigh and Pescatori (2011) cover both Cloyne (2013)'s exogenous and endogenous deficit categories. Moreover, as GLP underlined, the shocks

are note truly exogenous. In this sense, a critique as the one of Leeper (1997) on RR's narrative dataset for monetary shocks still applies, and the measure would fail a Granger-causality test. The other crucial issue of an action-based variable is the collection of data itself: this type of dataset are very time-consuming to be updated or enlarged adding new countries and variables.

Even if it is challenging to deal with these two fundamental issues, I have to emphasize that, at the best of my knowledge, all datasets on fiscal shocks suffer of endogeneity problems. However, an action based such as Devries, Guajardo, Leigh and Pescatori (2011)'s one is a step forward in addressing the endogeneity problem, since I have to consider that it collects data for a large panel of countries, and some simplifications are needed as opposed to when scholars collect data for only one country, as RR and Cloyne (2013). Moreover, as GLP discuss in their paper – section 2.3 –, not only their measure is fairly better than CAPB in identifying the size of the consolidation, but also it is orthogonal to unexpected movements in output, as I verified in my study. Hence, even if it is not exogenous, I can consider this changes in fiscal policy as predetermined which it is all I need to conduct my analysis without statistical concerns. On the other hand, I am optimistic that, since action-based dataset are now an essential instrument to analyze a wide range of macroeconomic topics, future researches will update and extend these datasets.

Narrative Fiscal Shocks

Country	Year	Impact	Country	Year	Impact	Country	Year	Impact	Country	Year	Impact
AUS	1985	0.45	DEU	1984	0.18	FRA	2000	-0.2	NLD	1982	1.71
AUS	1986	1.02	DEU	1991	1.11	GBR	1979	0.27	NLD	1983	3.24
AUS	1987	0.9	DEU	1992	0.46	GBR	1980	0.08	NLD	1984	1.76
AUS	1988	0.1	DEU	1993	0.11	GBR	1981	1.58	NLD	1985	1.24
AUS	1994	0.25	DEU	1994	0.91	GBR	1982	0.53	NLD	1986	1.74
AUS	1995	0.5	DEU	1995	1.08	GBR	1994	0.83	NLD	1987	1.48
AUS	1996	0.62	DEU	1997	1.6	GBR	1995	0.28	NLD	1988	0.06
AUS	1997	0.7	DEU	1998	-0.1	GBR	1996	0.3	NLD	1991	0.87
AUS	1998	0.37	DEU	1999	0.3	GBR	1997	0.69	NLD	1992	0.74
AUS	1999	0.04	DEU	2000	0.7	GBR	1998	0.31	NLD	1993	0.12
AUT	1980	0.8	DEU	2003	0.74	GBR	1999	0.21	NLD	2004	1.7
AUT	1981	1.56	DEU	2004	0.4	IRL	1982	2.8	NLD	2005	0.5
AUT	1984	2.04	DEU	2006	0.5	IRL	1983	2.5	PRT	1983	2.3
AUT	1996	2.41	DEU	2007	0.9	IRL	1984	0.29	PRT	2000	0.5
AUT	1997	1.56	DNK	1983	2.77	IRL	1985	0.12	PRT	2002	1.6
AUT	2001	1.02	DNK	1984	2.38	IRL	1986	0.74	PRT	2003	-0.75
AUT	2002	0.55	DNK	1985	1.54	IRL	1987	1.65	PRT	2005	0.6
BEL	1982	1.66	DNK	1986	-0.72	IRL	1988	1.95	PRT	2006	1.65
BEL	1983	1.79	DNK	1995	0.3	IRL	2009	4.74	PRT	2007	1.4
BEL	1984	0.69	ESP	1983	1.9	ITA	1991	2.77	SWE	1984	0.9
BEL	1985	1.61	ESP	1984	1.12	ITA	1992	3.5	SWE	1993	1.81
BEL	1987	2.8	ESP	1989	1.22	ITA	1993	4.49	SWE	1994	0.78
BEL	1990	0.6	ESP	1990	-0.4	ITA	1994	1.43	SWE	1995	3.5
BEL	1992	1.79	ESP	1992	0.7	ITA	1995	4.2	SWE	1996	2
BEL	1993	0.92	ESP	1993	1.1	ITA	1996	0.34	SWE	1997	1.5
BEL	1994	1.15	ESP	1994	1.6	ITA	1997	1.82	SWE	1998	1
BEL	1996	1	ESP	1995	0.74	ITA	1998	0.68	USA	1978	0.14
BEL	1997	0.91	ESP	1996	1.3	ITA	2004	1.3	USA	1980	0.06

CAN	1984	0.27	ESP	1997	1.2	ITA	2005	1	USA	1981	0.23
CAN	1985	1.03	FIN	1992	0.91	ITA	2006	1.39	USA	1985	0.21
CAN	1986	0.99	FIN	1993	3.71	ITA	2007	1.03	USA	1986	0.1
CAN	1987	0.28	FIN	1994	3.46	JPN	1979	0.12	USA	1988	0.85
CAN	1988	0.3	FIN	1995	1.65	JPN	1980	0.21	USA	1990	0.33
CAN	1989	0.31	FIN	1996	1.47	JPN	1981	0.43	USA	1991	0.58
CAN	1990	0.86	FIN	1997	0.23	JPN	1982	0.71	USA	1992	0.52
CAN	1991	0.4	FRA	1979	0.85	JPN	1983	0.42	USA	1993	0.32
CAN	1992	0.21	FRA	1987	0.26	JPN	1997	1.43	USA	1994	0.9
CAN	1993	0.35	FRA	1989	-0.2	JPN	1998	0.48	USA	1995	0.53
CAN	1994	0.49	FRA	1991	0.25	JPN	2003	0.48	USA	1996	0.29
CAN	1995	0.99	FRA	1992	-0.1	JPN	2004	0.64	USA	1997	0.3
CAN	1996	0.97	FRA	1995	0.28	JPN	2005	0.28	USA	1998	0.15
CAN	1997	0.47	FRA	1996	1.33	JPN	2006	0.72			
DEU	1982	1.18	FRA	1997	0.5	JPN	2007	0.15			
DEU	1983	0.87	FRA	1999	-0.1	NLD	1981	1.75			